

PREMIER COMPETITION MANUAL

AN APPEAL TO THE READERS

We are grateful to the candidates of 1983 Preliminary Examination who took pains to note down the questions that were asked in the Examinations and to send them to us in deference to our request. We hope to get the same type of help this year also.

So, if you are appearing in the 1984 I.A.S. Preliminary Examination and other Competitive Examination, we request you to render us a simple service which will enable us to guide you and the other candidates in future far more effectively by reconstructing; as far as possible, the Question Paper of the Examination for reference purposes.

Within a few days after the Examination, recollect as many questions in the Examination as you can (along with approximate responses) and write them down in a piece of paper and post it to the Author's address:

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Director

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Preface

The need for an all-inclusive compendium for Competitive Examinations of higher standard has long been felt. The book is meant to fill this need.

While by the very nature of things I make no claim to the originality of the bulk of the information found in the Book. The treatment of the subjects and approach to different branches of knowledge are strikingly different. Anyone who scans the pages of the book will surely be convinced of this. Volumes and treatises can be written and have been written on History, Geography, General Sciences, Indian Polity & Economy etc. The challenging task is not to enlarge on what is already written on these subjects but to cull out, from each of them, the pieces of information and the area of knowledge, immediately relevant to the Competition Candidates who do not, generally, have all the time in the world at their disposal to make a solid preparation for the ensuing Competitive Examinations.

The book is specially meant for the U.P.S.C. Civil Services Preliminary Examinations and other Competitive Examinations such as Indian Forest Service, Indian Economic Services, Indian Engineering Service Examinations, Bank Probationary Officers' Examinations, L.I.C., G.I.C. Asstt. Administrative Officers Exam etc. in which there is at least one General Paper Covering General Knowledge, General Studies, Intelligence & Arithmetic Tests, General English and Current Affairs in the Objective-Type only. In the selection of matters, the primary consideration, apart from the systematic coverage of the subjects, has been the relevance of the matter for the Objective-Type questions. The questions are accompanied by answers and brief Explanatory Notes. These questions are expected to serve as Models and Practice Tests. For the comprehensive coverage of the matter, in which the accent is on descriptive-type of answers, the candidate may refer to the Author's.

We hope that the general readers and those in the educational field will find the Book Interesting as a general reference book. University and College students can certainly use the book as a background builder for the various careers in life

Time was major constrain. Therefore I have rushed through some part, I crave the intulgence of the readers for discrepencies and mistakes that might have crept into the book owing to inadequacy of time

Suggestions

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PART I
HISTORY

HISTORY

History is the study of the past.. Nowadays, people are considered more important than rulers and so emphasis is placed on economic, social and cultural history, keeping the political history in the background. However, for a general candidate, history still means political history has always been considered an integral part of General Knowledge or General Studies. In India, accent is placed on Indian History and, in particular, on History of the Indian National (Freedom) Movement. Bulk of the questions in history relate to the Freedom Movement, national leaders and the British (Modern) Period.

History can be treated in ever so many ways. One of the oldest is the chronological treatment. We have tried to use this somewhat hackneyed treatment for a novel and interesting presentation of history. We hope the candidates will find it not only interesting but also immediately useful from the Examination point-of-view. A very comprehensive coverage of chronology has been attempted, keeping in mind the requirements of students of history for their subject-study. The more important events or items are indicated in bold letters to help a general candidate to memorize the basic outline before he proceeds with a detailed study.

'Indian Historical Personalities, Names and Terms' have been treated in the second chapter. We have not followed the usual alphabetical order ; nor have we stuck to the chronological order. While most of the dynasties have been accommodated, it has not been possible to present comprehensive information on economic, social and cultural matters. A separate chapter on Indian Historical Places is given.

A compact outline of World History, bearing in mind the sort of questions that have been put in various Competitive

Examinations is included. There are gaps in the presentation, but this action is deliberate since no purpose will be served by loading the candidate with information, useless from the examination point-of-view. The last chapter on World Historical Personalities, Names and Terms has also been prepared with the same perspective.

Indian History—Chronology

(From the Earliest History to the Present Day)

B.C.

- Circa* 1500 : The towns of the Harappan culture disappear.
- Circa* 600 : Large-scale habitations along with use of iron, appear in the Gangetic Plain. The Second Urbanisation in India starts. 16 Mahajanapadas (large states) in the Gangetic Plain.
- 563 : Birth of Gautama Buddha at Lumbini.
- 544 : Bimbisara of Haryanka dynasty establishes the first (Magadha) Empire in the Gangetic Plain (Capital-Girivraja or Rajgir)
- 540 : The birth of Mahavira at Vaisali.
- 528 : Siddhartha attains Nirvana at Bodh Gaya and starts preaching Buddhism.
- 516 : The Achaemenian ruler of Persia, Darius, establishes the Indian Satrapy (province) including Sindh and parts of Punjab.
- 498 : Mahavira attains perfect knowledge and starts propagation of Jainism.
- 483 : Death of Buddha at Kusinagar (Uttar Pradesh).
- 468 : Death of Mahavira at Pavapuri (Bihar).
- 326-325 : **Alexander's invasion of India.** Alexander defeats Porus near River Jhelum, goes upto River Beas and then retreats since his soldiers refuse to advance further.

- 324 : **Chandra Gupta Maurya defeats the reigning Nanda ruler and establishes the Maurya dynasty at Magadha (Capital : Patliputra).**
- 300 : **Accession of Bindusara on the death of Chandra Gupta Maurya,**
- 273 : **Asoka the son of Bindusara, ascends the throne of Magadha.**
- 261 : **The Kalinga war of Asoka and his conversion to pacifism.**
- 232 : **Death of Asoka.**
- 185 : **Pushyamitra Sunga establishes the Sunga Dynasty by murdering the last Maurya ruler.**
- 165 : **The Indo-Greek King Menander rules in North-West India from Sialkot (Pakistan Punjab).**
- 130 : **The most famous of the Saka kings Rudradaman I comes to power and rules over Western India.**
- 58 : **The commencement of the Vikrama era from the year of victory of the Ujjain King Vikramaditya over the Sakas.**
- A.D. 78 : : The commencement of the Saka Era by the most famous of the Kushan Rulers, Kanishka.**
- 78-101 : : **The reign of Kanishka in North-West India with Peshawar as capital.**
- 106 : : **The Satavahana Kingdom in the Deccan reaches the peak under Gautamiputra Satakarni.**
- 130-150 : : **The reign of Rudradaman I, the great Saka ruler in Western India.**
- 176 : : **The death of the last great Kushan King, Vasudeva I.**
- 320 : : **The founding of the Gupta dynasty at Pataliputra by Chandra Gupta I.**

- 330 : : Accession of Samudra Gupta on the death of his father:
- 380 : : Chandra Gupta II, son of Samudra, starts his reign.
- 399-414 : : The visit of the Chinese pilgrim Fahsien to India.
- 467 : : The death of Skanda Gupta, the last of the Imperial Guptas.
- 485 : : The Hun invaders establish their rule in parts of Malwa.
- Circa 500 : : The Huns establish their Kingdom in Kashmir, Punjab and Western India.
- 532 : : Yasodharma of Malwa defeats the Hun king, Mihirakula and challenges the supremacy of later Guptas in Eastern India.
- 550 : : The end of the Indian trade with the Eastern Roman Empire through land.
- 566 : : Ascendency of the Chalukyas of Vatapi.
- 606-647 : : Accession of Harshavardhana at Thanesar.
- 609 : : Pulekesin II ascends the throne at Vatapi.
- 610 : : Pulekesin II conquers the region between the Krishna and the Godavari from the Pallavas.
- 610 : : Harsha's expedition to the south is repelled by Pulekesin II
- 629-645 : : Visit of Hsuan Tsang, a Chinese pilgrim to India.
- 637 : : The First Arab (Muslim) ~~reach~~ ~~the~~ (upto Thana near Bombay).
- 642 : : The Great Pallava, Narasimha ~~defeats and kills Pulekesin~~ ~~at~~ ~~Vatapi~~.
- 657 : : Wang-Hsien-Tse completes ~~his~~ ~~the~~ the Chinese envoy in ~~the~~.
- 675-685 : : Ending the Chinese :

711-713 : : The First Muslim (Arab) invasion of India. Mohammed bin Qasim, the deputy of the Arab governor of Iraq, invades Sindhu and occupies certain principalities including Multan. A Muslim governor of Sindh is appointed.

- Circa 720 : : Yasovarman of Kanauj reigns supreme in Central and Eastern India.
- 740 : : The Great Pallava Dynasty extinguished by the Chalukya king Vikramatitya II.
- 757 : : Dandidurga, a feudatory of the Chalukyas overthrows the Chalukyan ruler and founds the Rashtrakuta dynasty with capital at Malkhed (near Sholapur).
- 793 : : Accession of Govinda III, the Rashtrakuta.
- 810 : : Deva Pala ascends the throne of Gauda (Bengal).
- 815-877 : : The reign of the great Rashtrakuta ruler, Amoghavarsha.
- 836 : : The greatest ruler of the Pratihara dynasty, Bhoja ascends the throne at Kanauj.
- 892 : : Accession of Bhima I of the dynasty of Eastern Chalukyas.
- 897 : : The Chola king at Tanjore defeats and kills the last Pallava king. The end of the Pallavas of Kanchi.
- 915 : : The Rashtrakuta ruler, India III sacks Kanauj and defeats Mahipala, the Pala ruler of Bengal. The supremacy of the Rashtrakutas in Western and Central India.
- 949 : : Krishna III defeats the Chola king Parantaka I and annexes the northern part of the Chola kingdom.
- 963 : : Rashtrakuta king Krishna III defeats the Pratihara Ruler. Disintegration of the Pratihara Empire.

- 973 : : Foundation of the Later Chalukya Empire at Kalyan.
- 978 : : The Paramara ruler, Siyak of Malwa sacks the Rashtrakota capital and hastens the end of the Rashtrakuta Empire.
- 985 : : Accession of Rajaraja I, the first of the Great Cholas at Tanjore.
- 1001 : : Mahmud of Ghazni defeats the Hindushahi ruler of Peshawar and Punjab, Jaya Pala.
- 1008 : : At the battle of Waihind (near Peshawar) Mahmud of Ghazni defeats the Hindushahi king Ananda Pala.
- A.D. 1012 : : Rajendra I succeeds his father, Rajaraja I at Tanjore.
- 1022 : : Rajendra I marches towards the Ganga in Bengal and defeats different rulers on the way.
- 1025 : : Mahmud of Ghazni plunders the Somnath temple during his seventeenth raid into India.
- 1070 : : Accession of Kulottunga I, the last of the Great Cholas.
- Circa 1098 : : Reign of Kirthivarman, a famous Chandella king in Central India.
- 1170 : : Accession of Jayachandra, the Gahadavala ruler of Kanauj.
- 1175 : : Muizzuddin Muhammad of Ghur's first invasion of India. He takes Multan fort.
- 1178 : : Muizzuddin Muhammad Ghur tries to conquer Gujarat but is repulsed by its ruler, Bhima II.
- 1179 : : Muhammad of Ghur conquers Peshawar.
- 1186 : : Lahore is taken by the Ghaznavid ruler, Muizzuddin Muhammad.

- 1191 : : The First Battle of Tarain between Muizzuddin Muhammad and Prithvi-raj Chauhan of Ajmer. Muhammad is routed.**
- 1192 : : The Second Battle of Tarain between Muizzuddin Muhammad and Prithvi-raj Chauhan. One of the most decisive battle in Indian History. Prithvi-raj escapes but is captured and is later allowed to continue to rule Ajmer. Delhi which was under the control of Ajmer is restored to its former ruler of Tomara dynasty.**
Qutbuddin Aibak, a slave of Muizzuddin Muhammad is appointed as the deputy of Muhammad in India.
Aibak occupies Delhi. Later Ajmer is also annexed.
- 1194 : : Muhammad defeats the Gahadavala ruler of Kanauj, Jaichandra at the Battle of Chandwar (near Kanauj).**
- 1206 : : Muhammad undertakes his last campaign in India to suppress the rebellion of the Khokhars in the Punjab.**
He is killed by a Muslim fanatic. After the death of Muizzuddin, Aibak assumes independence and starts the dynasty of Mameluk Sultans.
- 1210 : : Qutbuddin dies in an accident and is, after sometime, succeeded by his son-in-law, Iltutmish.**
- 1214 : : The Turkish General, Bakhtiyar Khalji occupies Nadia, the capital of the Sena kings of Bengal.**
- 1221 : : The first invasion of the Mongols under Chengiz Khan.**
- 1226 : : Iltutmish's forces take Bengal and Bihar.**
- 1228 : : Ahoms establish their kingdom in Assam.**

- 1229 : : Iltutmish obtains letter of investiture from the Abbaside Caliph of Turkey.
- 1236 : : On the death of Iltutmish, his nominee Raziya Sultana ascends the throne of Delhi after some conflict. Struggle for power between the Sultana and the Turkish nobles.
- 1239 : : Raziya Sultana is killed in the jungle. Instability at Delhi.
- 1241 : : The Mongol invaders capture Lahore.
- 1246 : : A Turkish Chief, Ulugh Khan gradually usurps power at Delhi under the puppet Sultan, Nasiruddin Mahmud.
- 1265 : : On the death of Nasiruddin Ulugh Khan ascends the throne at Delhi with the title Balban.
- 1286 : : Death of Balban and accession of Kaiqubad.
- 1288 : : Visit of Marco Polo, the Venetian traveller to India on the way to China.
- 1290 : : **Jalaluddin Khalji establishes the Khalji dynasty by overthrowing the last Mameluk Sultan of Delhi.**
- 1294 : : Sack of Devagiri (Deogir) by Allauddin Khalji.
- 1296 : : **Allauddin Khalji comes to power by murdering his father-in-law, Jalaluddin Khalji.**
- 1299 : : Allauddin invades Gujarat and annexes it; captures Malik Kafur as a slave.
- 1301 : : Allauddin invests the fort of Ranthambhor and takes it.
- 1303 : : Allauddin ravages the Chittor fort and subdues it.
- 1305 : : By now Allauddin Khalji has forced all the Rajput States to submit to him.
- 1306 : : Allauddin drives out the erstwhile ruler of Gujarat, Rai Karan from Malwa and annexes it.

- 1307 : : Malik Kafur subdues Rai Ramachandra, the ruler of Deogir.
- 1309 : : Malik Kafur undertakes the expedition against the ruler of Warangal.
- 1311 : : The army of Malik Kafur invests the city of Madurai and plunders its wealth.
- 1315 : : Deogir is annexed to the Delhi Sultanat after the suppression of the rebellion of the son of Rai Ramachandra.
- 1316 : : Death of Allauddin Khalji. Instability in the Delhi Court. Malik Kafur takes part in the palace intrigues and is killed.
- 1320 : : Ghiyasuddin Tughlaq rebels against the then Delhi Sultan Khusrav and kills him. **The commencement of the Tughlaq dynasty.** The Mongol leader Dalucha occupies Kashmir and ravages villages and towns.
- 1321 : : Mohammed-bin-Tughlaq, son of Ghiyasuddin, besieges Warangal and annexes it.
- 1322 : : Annexation of Mabar to Delhi Sultanat.
- 1323 : : Mohammed subdues Bengal.
- 324 : : **Mohammed-bin-Tughlaq ascends the throne on the death of his father.** The armies of Delhi Sultanat go up to Madurai.
- 1328 : : The Hindu principality of Kampili in South Karnataka is annexed to the Delhi Sultanat. **Transfer of the capital of Delhi Sultanat from Delhi to Deogir (Dauladabad).**
- 1329 : : Mohammed Tughlaq defeats the Mongol invaders in the battle of Jhelum, and extends his empire upto Peshawar.
- 1330 : : Mohammed Tughlaq introduces the token currency system which ends in failure.
: Tughlaq abandons the new capital of Dauladabad and returns to Delhi.
- 1333-1342 : : Ibn Battuta, the Moroccan traveller visits India.

- 1336 :: **Harihara, an erstwhile feudatory of Kakatiyas of Warangal crowns himself at Vijayanagar.**
- 1338 :: Tughlaq undertakes an expedition against the Kangra (Nagarkot) hills and suffers major reverses.
 : Famine and plague devastate the region around Delhi.
 The Sultan leaves Delhi and lives in a camp 100 kilometres away in the Doab.
- 1342 : Ilyas Khan establishes his dynasty in Bengal with Pandua as his capital.
- 1346 :: By now, the entire domains of the erstwhile Hoysala kingdom have been annexed to the Vijayanagar kingdom.
- 1347 :: **Allauddin Hasan Bahman Shah founds the Bahmani kingdom.**
- 1351 :: Tughlaq undertakes an expedition to Sindh to put down the rebellion but dies in the camp. Firuz, his nephew, succeeds him.
- 1356 :: On the death of Harihara, his brother Bukka ascends the throne of Vijayanagar.
- 1367 :: **The contest, for the control of the Tungabhatra Doab, between Vijayanagar and Bahmani kingdoms at its peak.**
- 1377 :: Death of Bukka. The Vijayanagar empire extends upto Rameswaram in the South.
- 1377-1406 :: The reign of Harihara II.
 : Bahmani Sultan enters into a treaty with the ruler of Warangal for an alliance against the Vijayanagar.
 : Harihara II wrests Belgaum and Goa from the Bahmani kingdom.
- 1386 :: Firuz Tuglaq dies. Instability and struggle for succession in the Delhi Sultanat.
- 1389 :: Sikandar Shah establishes a reign of terror in Kashmir.

- 1393 : : Establishment of an independent Sultanat at Jaunpur by Sharqi (Malik Sarwar).
- 1397-1422 : : Reign of Firuz Shah Bahmani at Gulbarga.
- 1398 : **Invasion of Timur and plunder of Delhi.**
- 1406 : Deva Raya I ascends the throne of Vijayanagar.
- 1407 : Zafar Khan establishes an independent kingdom in Gujarat and Malwa.
- 1411 : Ahmad Shah I ascends the throne in Gujarat.
- 1413 : Ahmad Shah I founds the city of Ahmadabad and shifts his capital from Patan to Ahmadabad.
- 1419 : With the aid of Warangal, Deva Raya I defeats Firuz Shah Bahman and annexes a part of Bahmani kingdom.
- 1420 : Zainul Abidin ascends the throne in Kashmir and endears himself to the Kashmiris because of his liberal policies and actions for 50 long years.
- 1422-1466 : The reign of Deva Raya II:
- 1422 : Firuz Shah Bahman is compelled to abdicate in favour of his brother Ahmad Shah I.
- 1422 : Ahmed Shah invades Warangal and after killing the ruler annexes its territories.
- 1427 : Ahmed Shah shifts the capital of the Bahmani kingdom from Gulbarga to Bidar.
- 1433 : A famous Ruler of Mewar, Rana Kumba, comes to power.
- 1436 : Mohamed Khalji, the most powerful of the Malwa rulers ascends the throne.
- 1443 : Deva Raya II tries to recover the region, south of the Krishna river from the Bahmani Sultan but fails.
- 1451 : **Bahlul Lodi, an Afghan noble ascends the throne of Delhi after deposing the last Saiyid ruler.**
- 1459 : Mohammed Begarha ascends the throne in Gujarat and, during his rule of 50 years, makes Gujarat a major power in Western India.

- 1461 : **The ascedency of Mahmud Gawan as the Prime Minister (Peshwa) of the Bahmani rulers.**
- : Gawan repulses the attacks of the army of the Delhi Sultanat.
- 1465 : A Chauhan prince founds the state of Marwar with his capital at the new city of Jodhpur.
- 1469 : **Birth of Guru Nanak.**
- 1482 : Gawan is executed by the Bahmani Sultan as a result of the palace intrigues in the Bahmani court.
- 1484 : Bahlul Lodi occupies Jaunpur and annexes the Sharqi kingdom.
- 1485 : **The disintegration of the Bahmani kingdom into the five principalities of Golconda, Bijapur Ahmednagar, Berar and Bidar starts. Berar becomes independent.**
- 1489 : Sikandar Lodi comes to power at Delhi.
- 1490 : Adil Shahi dynasty at Bijapur and Nizam Shahi dynasty at Ahmadnagar establish independent sultanates.
- 1498 : **Vasco da Gama lands at Calicut via the Cape of Good Hope and is welcomed by the Zamorin. Inaugurates the Portuguese trade with India.**
- 1506 : Sikandar Lodi founds the city of Agra.
- 1508 : Rana Sanga the grand son of Kumba comes to power in Mewar.
- 1509-1530 : **The reign of Krishna Deva Raya of the Tuluva dynasty at Vijayanagar.**
- 1509 : The ruler of Gujarat extends support to the Sultan of Egypt in fighting against the Portuguese menace at sea. The portuguese win.
- : Albuquerque is appointed as the Governor of the Portuguese territories in the East.
- 1510 : The Portuguese capture Goa from Bijapur
- 1515 : Kutb Shahi dynasty at Golconda ~~becomes~~ independent Sultanate.

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- 1517 : Death of Sikandar Lodi. Ibrahim Lodi succeeds him.
- 1517 : Rana Sanga of Mewar defeats the ruler of Malwa and brings about the disintegration of Malwa.
- 1520 : Ibrahim Lodi, Delhi Sultan, invades Mewar but is repulsed by Rana Sanga.
- 1520 : Krishna Deva Raya defeats the ruler of Bijapur and sacks Gulbarga.
- 1525 : Babur defeats Daulat Khan Lodi, the Governor of Punjab and occupies Punjab.
- 1526 : (April 20) **First Battle of Panipat. Babur defeats the Delhi Sultan Ibrahim Lodi.**
- 1527 : **Battle of Khanwa in which Babur defeats Rana Sanga of Mewar** who is supported by some Afghan chiefs and Rajput rulers.
- 1530 : **Death of Babur** on his way to Kabul. **Humayun ascends the throne at Agra.**
- 1530 : Struggle for succession in Vijayanagar kingdom following the death of Krishna Deva Raya.
- 1531 : The Portuguese build a fort at Chaul in Gujarat Coast.
- 1531 : Bahadur Shah of Gujarat concludes a defensive-offensive alliance with the Portuguese against the Mughals and permits the former to build a fort at Diu.
- 1532 : Humayun defeats Sher Khan but allows the latter to retain possession of the Chunar Fort.
- 1535 : Humayun defeats Bahadur Shah, the ruler of Gujarat and Malwa but fails to retain these provinces.
- 1536 : In a scuffle following negotiations at Diu, Bahadur Shah is drowned in the sea and the Portuguese governor of the fort is killed.
- 1538 : Humayun recaptures Chunar fort from Sher Khan.

- 1539 : Sher Khan traps Humayun during the latter's campaign in Bengal and finally defeats him at Chaunsa.
- 1540 : **The Mughal army led by Humayun and his younger brothers is finally defeated by Sher Khan at the battle of Kanauj. Sher Shah establishes the Sur empire at Delhi.**
- 1542 : Akbar, the son of Humayun born at Amarkot (Rajasthan)
- 1543-1565 : Ascendency of Rama Raja in the Vijayanagar Court. He managed to defeat the Deccan Sultanats of Bijapur, Golconda and Ahmadnagar individually by playing one against the other.
- 1544 : At the battle of Samel, Sher Shah defeats the Rajput confederacy led by Maldeo of Marwar.
- 1545 : Sher Shah conducts the campaign against Kalinjar in Bundelkhand and wins but is killed in a gun accident. **Islam Shah succeeds him.**
- : Humayun, after wandering through many countries, captures Qandhar and Kabul from his brother, Kamran with the help of the Iranian king.
- 1553 : Islam Shah, the second ruler of the Sur dynasty dies. The disintegration of the Sur empire.
- 1555 : **Humayun defeats the Afghans and recovers Delhi and Agra.**
- : **He dies in an accident.**
- 1556 : **On the death of Humayun, Akbar is crowned as king at Kalanaur in the Punjab** where he was conducting a campaign against the Afghan rebels.
- : Hemu, the Hindu General of Mohammad Adil Shah, the Sur ruler of Ghunar, defeats the Mughal army near Delhi and occupies it.
- : **(November 5) Second Battle of Panipat.** In the course of the battle, Hemu is hit and the

Afghan army disintegrates. The Mughal supremacy is re-established.

- 1560 : Akbar dismisses Bairam Khan from office. The latter rebels but is defeated and chooses to go to Mecca.
- 1561 : Mughal invasion of Malwa.
- 1564 : Akbar abolishes the poll tax (jizyah)
- 1565 : The combined armies of Bijapur, Golconda and Ahmadnagar defeat the Vijayanagar army at the Battle of Bannihatti, near Talikota. Vijayanagar looted and destroyed.
- 1566 : The Portuguese and Ottoman Turks enter into an agreement to share the trade in the Indian Ocean without any clash in the seas.
- 1568 : The Chittoor Fort falls to Akbar. Rana Uday Singh of Mewar retires to the hills and carries on guerilla warfare against the Mughals.
- 1570 : Ali Adil Shah, Sultan of Bijapur, in alliance with Ahmednagar and Calicut tries to evict the Portuguese from their possessions but fails.
- 1572 : Rana Pratap succeeds Rana Uday Singh.
- 1572 : Akbar builds Fatehpur Sikri near Agra as his capital.
- 1573 : Akbar's army defeats the Mirza brothers and annexes Gujarat. The first understanding between the Portuguese and the Mughals.
- 1575 : Ibadat Khana (Hall of prayer) opened by Akbar at Fatehpur Sikri.
- 1576 : Daud Khan, the last Afghan ruler of Bengal and Bihar, is defeated and executed. Bihar and Bengal are annexed to Mughal empire.
- : Battle of Haldighati, (Gogunda). Rana Pratap is defeated by the Mughal army led by Raja Man Singh. The Rana escapes and later resorts to guerilla warfare till his death.

- 1577 : The introduction of the Mansabdari system by Akbar.
- 1581 : The rebellion in various parts of the Mughal empire, mainly directed by the Muslim clergy (Ulema).
: Akbar marches into Kabul and Mirza Hakim is defeated.
- 1582 : The debates in the Ibadat Khana discontinued.
Promulgation of the Tauhit-i-Ilahi.
- 1585 : Akbar settles in Lahore for 12 years to ward off the threat in the North-West India, posed by Mirza Hakim, the ruler of Kabul and the Uzbeks.
- 1590 : Akbar conquers Sindh.
- 1591 : Akbar turns his attention to the Deccan. His diplomatic efforts to force the Deccani states to acknowledge Mughal suzerainty fail.
- 1592 : Annexation of Orissa by Akbar.
- 1596 : The Mughals conclude a treaty with Chand Bibi, the ruler of Ahmednagar. The latter recognises Mughal suzerainty and cedes Berar to the Mughals.
- 1597 : The Mughal army defeats the combined forces of Bijapur, Golconda and Ahmednagar.
- 1600 : Following the harassment of the Deccani forces in Berar, the Mughals annex Balaghat and set up a garrison at Ahmednagar.
: **(December 31) The English Royal Charter to the East India Company of England.**
- 1601 : The Mughals defeat Malik Ambar, the Ahmednagar General at the battle of Nanded.
: Akbar captures Asirgarh Fort and annexes Khandesh.
: The first voyage of the English East India Company to the East.
- 1602 : The Dutch East India Company is published.
- 1605 : **Death of Akbar and accession of Jahangir.**

- 1606 : Rebellion of Khusrau against his father and its suppression
- 1608 : **The English East India Company opens the first factory at Surat.**
- 1609-1611 : Hawkins stays at Agra and obtains favours in Jahangir's Court
- 1610 : **Malik Amber organises the forces of the different Deccan states and expels the Mughals from the Deccan states.**
- 1611 : Jahangir marries Nur Jahan.
- 1611 : The English Company establishes its first factory in South India at Masulipattinam.
- 1612 : The English Navy defeats the portuguese at Swally near Surat.
- 1613 : Jahangir settles the dispute with Mewar by forcing the Rana to depute his son to the Mughal Court and treating the Rana with consideration.
- 1616 : The British ambassador, Sir Thomas Roe, in the Mughal Court, He gets the imperial firman to trade and to establish factories in all parts of the Mughal Empire.
- 1616 : The Mughal Commander Khan-i-khanan inflicts a crushing defeat on the combined forces of Ahmednagar, Bijapur and Golconda. However, Ambar continues to organise the Deccan resistance to the Mughal domination.
- 1620 : Fierce naval battle between the portuguese and the English, ending in victory to the English.
- 1621 : Shah Jahan (Prince Khurram) kills Khuzrav in prison.
- 1622 : Shah Jahan's rebellion against his father, Jahangir whose health breaks down.
- 1624 : Shah Jahan is finally defeated by Jahangir's forces and is pardoned by his father.
- 1625 : The English East India Company's attempts to fortify their factory at Surat is foiled by the Mughals.

- 1627** : **Jahangir dies near Lahore. Shah Jahan imprisons Nur Jahan and ascends the throne after killing all the rival claimants.**
- 1629 : Saha Jahan organizes a major attack on Ahmednagar but fails to subdue it.
- 1630 : Rivalry between the portuguese and the English ceases.
- 1631 : The portuguese clash with the Mughals in Bengal and are driven out of their settlement at Hooghly.
- 1632 : Fath Khan, the son of Malik Ambar surrenders Ahmednagar to the Mughals.
- 1633** : **Mahabat Khan, the Mughal Governor of the Deccan takes Dauladabad and extinguishes the Nizam Shahi dynasty of Ahmednagar.**
- 1636 : Shah Jahan concludes treaties with Bijapur and Golconda forcing them to accept the suzerainty of the Mughal emperor.
- ... : Aurangzeb appointed the Mughal Viceroy of the Deccan.
- 1639 : The English take on lease, Madras from the local ruler and start the fortification of Fort St. George.
- 1645** : **Shivaji starts his career of conquest at the Young age of 18.**
- 1651** : **The English Company gets permission of Nawab of Bengal to trade at Hooghly in Bengal.**
- 1654-1667 : Intermittant battles between the Dutch Company and the English Company in India. Finally victory in India. to the English.
- 1656 : Shivaji conquers the Javli Kingdom in Maharashtra.
- ... : The death of Mohamed Adil Shah leads to the subjugation of the Deccan states by the Mughal Government.

- : Shah Jahan falls ill and wants to crown his eldest son, Dara Shikoh.
- 1657 : Shivaji enters into an agreement with Aurangzeb regarding the conquest of the territories of Bijapur Kingdom.
- 1658 : **Aurangzeb defeats Shah Jahan's army at Dharmat.**
- 1658-1659 : **In the Battle of Samugarh, Dara is defeated by Aurangzeb. Aurangzeb starts his reign, having imprisoned his father and having got rid of his brothers.**
- 1659 : Shivaji murders the Bijapur General Afzal Khan and defeats the Bijapur army, sent to capture him.
- 1660 : Shivaji attacks the Mughal General Shaista Khan at his camp in Poona.
- 1662 : The Portuguese cede the island of Bombay to King Charles II of England as dowry for his Portuguese wife,
- 1663 : The Mughals defeat the Ahoms and extend the Eastern boundary of the Mughal empire to the Bharali river.
- 1664 : **The founding of the French East India Company by the French Minister, Colbert.**
: Shivaji attacks the Mughal fort at Surat and plunders the Mughal treasure there.
- 1665 : **Aurangzeb orders the destruction of newly built temples.**
: Aurangzeb deposes Raja Jai Singh to defeat Shivalji. **Jai Singh besieges the purandar fort and compels Shivaji to enter into a treaty.**
: Shivaji undertakes a combined expedition against Bijapur along with the Mughal forces but is defeated.
- 1666 : The Mughal Governor of Bengal, Shaista Khan, destroys the Arakan navy and captures Chittagong.

- : Jai singh persuades Shivaji to visit the Mughal emperor at Agra. Shivaji is interested at the Mughal Court but escapes.
- : Death of Shah Jahan in prison.
- 1667 : The Afghans led by a tribal leader rise against Mughal rule. The Mughal General Amir Khan suppresses the uprising.
- 1668 : The English King hands over the island of Bombay to the Company.
- 1669 : The Jat rebellion headed by Gokla against the Mughal Government is suppressed.
- 1670 : Shivaji plunders the Surat fort of the Mughals a second time and recovers many of the forts ceded to the Mughals earlier according to the treaty of Purandar.
- 1672 : The rebellion of Satnamis, near Mathura, against the Mughal Government is suppressed.
- : The second Afghan rebellion led by Akmal Khan. The Mughal authority is defied and the Mughal forces are defeated.
- 1674 : **Shivaji crowns himself as Emperor at Raigarh.**
- : Foundation of Pondicherry by the French Company.
- 1675 : Aurangzeb goes to Peshawar and suppresses the Afghan resistance.
- : Ninth Guru Tej Bahadur of Sikhs is executed by Aurangzeb.
- 1676 : Shivaji undertakes his last major expedition in Carnatic territories belonging to Bijapur.
- 1678 : Following the death of Jaswant Singh, the Maharana of Marwar, Aurangzeb interferes in the struggle for succession and thereby earns the hostility of the Rajputs.
- 1679 : Aurangzeb attacks Mewar since the Rana of Mewar had taken the opposite side in the struggle for succession at Marwar
- : Aurangzeb reimposes Jizyah.

- 1680 : **The death of Shivaji.**
- 1681 : **Aurangzeb's sustained campaign in the Deccan starts.**
- 1685 : The Second Jat rebellion under the leadership of Rajaram and Churaman is suppressed gradually.
- 1686 : The English at Hooghly declare war on the Mughal Empire and are defeated but pardoned.
: **Fall of Bijapur to the Mughal campaign.**
- 1687 : Annexation of Golconda to the Mughal empire.
- 1689 : Execution of Sambhaji by Aurangzeb. Rajaram succeeds as the Maratha leader.
- 1691 : The English Company gets exemption from the payment of customs duties in Bengal from the Mughal emperor.
: Foundation of Calcutta.
- 1692 : Renewed fight between the Marathas and the Mughal emperor at camp in the Deccan.
- 1698 : Some private merchants in England found a rival company known as the New Company.
: The English East India Company buys the villages Sultanati, Kalikata and Govindpur and builds Fort William.
- 1699 : **Tenth Guru, Govind Singh founds Khalsa, the Sikh military brotherhood at Anandpur.**
- 1702 : The two English Companies for trade in India are amalgamated under the name 'The Limited Company of Merchants of England trading to the East Indies'.
- 1704 : Guru Govind Singh repulses the attack by a number of local hill rulers on Anandpur.
- 1705 : The Mughal Government supporting the hill rulers lays siege of Anandpur fort and forces the Guru to retreat to the hills

- 1706 : Guru Govind Singh is reconciled with the Mughals and goes to the Deccan to meet Aurangzeb.
- 1707 : Aurangzeb retreats to Aurangabad after failure of his efforts to capture all Maratha forts.
- 1707 : **The death of Aurangzeb at Aurangabad.** After the internecine conflicts, Bahadur Shah I ascends the throne at Delhi.
- 1707 : Shahu, the grandson of Shivaji is released from the Mughal prison and takes part in the war of succession at Satara.
- 1708 : Guru Govind Singh joins the camp of Bahadur Shah I as a noble but is murdered treacherously by his employee.
- 1712 : Death of the Bahadur Shah I. Continuing wars of succession.
- 1713 : Farrukh Siyar becomes the Mughal Emperor with the help of the Saiyid Brothers.
- 1713 : **Balaji Viswanath, the Peshwa of king Shahu, rises to prominence. The period of Peshwa domination in Maratha politics starts.**
- 1717 : **Murshid Quli Khan, the Mughal Governor of Bengal establishes the Nawabate in Bengal.**
- 1717 : The English Company gets from Emperor Farrukh Siyar the firman, granting privileges in Bengal, Gujarat and Deccan.
- 1719 : Peshwa Balaji Viswanath helps Saiyid Brothers to overthrow the then Mughal Emperor Farrukh Siyar. Mohamed Shah becomes the Mughal Emperor.
- 1720 : Baji Rao I succeeds his father, Balaji Viswanath as the Peshwa in the Maratha Court.
- 1722 : **Saadat Khan is appointed as the Mughal Governor of Avadh. Gradually he gains independence and becomes the Nawab of Avadh.**

- 1724** : Nizam-ul-Mulk relinquishes the office of Wazir of the Mughal Empire at Delhi and goes to the Deccan to found the State of Hyderabad.
- 1729** : The Kingdom of Travancore rises to prominence under king Marthanda Verma.
- 1739** : **The invasion of Nadir Shah.** At the Battle of Karnal, Emperor Mohamed Shah is taken prisoner and led to Delhi. Plunder of Delhi.
- : Alivardi Khan deposes the son-in-law of Murshid Quli Khan and becomes the Nawab of Bengal.
- : Safdar Jang becomes the second Nawab of Avadh.
- 1740** : The death of Baji Rao I and succession of Balaji Baji Rao.
- 1742** : Maratha invasion of Bengal.
- 1744-1748** : **First Anglo-French War (Carnatic War) in India.** The English capture French ships and threaten Pondicherry. The French retaliate and occupy Madras. The British appeal to the Nawab of Carnatic who fights against the French troops in a battle at Madras and is thoroughly defeated. As a result of the general settlement between France and England in Europe, the First Anglo-French war ends with the restoration of the *status quo ante*.
- 1748** : The death of Emperor Mohamed Shah. Instability in the Mughal Empire.
- 1748-1767** : Repeated invasion and plunder of North India by the Afghan ruler, Ahmed Shah Abdali.
- 1749** : The death of King Shahu who leaves the entire State in the Peshwa's hand through his will. Balaji Baji Rao shifts the capital of the State to Poona from Satara.
- 1749-1754** : **Second Anglo-French War.** The French Governor-General, Dupleix takes part in the

palace intrigues at Carnatic and Hyderabad and establishes his influence in the courts of the Nawab of Carnatic and the Nizam of Hyderabad. The English, following the advice of Robert Clive take side with Mohamed Ali in the contest for succession at Carnatic. By a clever strategy of Clive, the Nawab of Carnatic, Chanda Sahib is defeated along with the French troops. The English win and set up Mohamed Ali as the Nawab of Carnatic.

: Dupleix is recalled by the French Government. Settlement between the English and the French.

1754 : Alamgir II ascends the throne of Delhi.

1756-1763 : Third Anglo-French War following the outbreak of hostilities between England and France in Europe.

1756-1763 : The Jats around Delhi establish a powerful kingdom under Surajmal

1756 : The new Nawab of Bengal, Siraj-ud-daulah tries to discipline the English Company in Bengal but fails. He seizes Fort William and drives out the Company officials to the sea.

1757 : The aid from Madras to the Bengal factory reaches Calcutta. The English under Clive recapture Calcutta and compel Siraj-ud-daulah to concede all their demands.

: (June 23) The Battle of Plassey. The English forces defeat the Nawab's army and instal the traitor Mir Jafar on the throne of Bengal.

1758 : The Marathas overrun the Punjab.

1759 : Accession of Shah Alam II to the throne of Delhi.

1760 : Battle of Wandiwash in which the English defeat the French forces finally.

: The English force Mir Jafar to abdicate in favour of his son-in-law, Mir Qasim who rewards them with large tracts of land and money.

1761

: **Third Battle of Panipat.** The Maratha army under the Peshwa's son is routed by the Afghan Chief, Ahmed Shah Abdali in alliance with Najib-ud-daulah of Rohilkhand and Shuja-ud-daulah of Avadh.

: Death of Peshwa Balaji Baji Rao. Madhav Rao succeeds him.

: Haider Ali overthrews the Hindu dynasty in the Mysore State.

1763

: Mir Qasim, unable to bear the atrocious conduct of the English Company officials, engages in a series of battles with the Company but is thoroughly vanquished. Mir Jafar is restored on the throne of Bengal.

: According to the Treaty of Paris between England and France after the seven year's War in Europe, the French factories in India are restored to the French Government but on the condition that they could not be fortified any longer. **Thus ended the Third Anglo-French War in the ultimate victory of the English Company.**

1764-65

: (22 October 1764) The Battle of Buxar and Treaty of Allahabad (1765). The combined armies of Mir Quasim, Shuja-ud-daulah, the Nawab of Avadh and Shah Alam II, the fugitive Mughal Emperor is defeated by the English. The Company forces the Mughal Emperor to remain as their pensioner at Allahabad. The Emperor is forced to grant the diwani of Bengal, Bihar and Orissa to the Company. The Nawab of Avadh is forced to enter into an alliance with the Company as its dependant.

- 1765 : Death of Mir Jafar in Bengal. **Introduction of the Dual System of Government in Bengal.**
- 1767 : Clive, Company's Governor in Bengal.
- 1767-1769 : Verelst, Company's Governor in Bengal.
- 1770 : First Anglo-Mysore War. Haidar Ali dictates terms to the Madras Fort. Later the Company and Haidar Ali enter into a mutual-help pact.
- 1770 : The Great Famine of Bengal. Nearly one-third of Bengal's population is wiped out.
- 1771 : The Marathas bring the Delhi Emperor Shah-Alam from Allahabad to Delhi and keep him as their pensioner.
- 1772-1774 : *Warren Hastings, Company's Governor in Bengal.*
- 1772 : **The end of the Dual Government (Dyarchy) in Bengal. The Company starts direct administration of Bengal.**
- 1772 : Death of Peshwa Madhav Rao. Civil war in the Peshwa's Court.
- 1773 : **The Regulating Act establishing control over the Company's forces India by the British Government.**
- 1774-1785 : *Warren Hastings, the first Governor-General of Bengal.*
- 1774 : The First British Court in India, Supreme Court at Calcutta, established.
- 1775-1782 : I Anglo-Maratha War. The Marathas led by Mahadji Sindhia proved a match to the English forces. The War ended with the Treaty of Salbai, according to which the *status quo ante* was to be maintained. Twenty years of peace between the British and the Marathas followed.
- 1780-1784 : The Second Anglo-Mysore War. Haidar Ali inflicted serious defeats on the Company's forces but Warren Hastings, by skilful diplomacy isolated Mysore and defeated Haidar Ali at Port Nova in 1781. Haidar Ali died in 1782.

War was continued by his son Tippu Sultan. Both sides signed the Peace Agreement (Treaty of Mangalore) in 1784 and restored the *status quo ante*.

- 1781 : Warren Hastings sets up the Calcutta Madrasa for the study of Muslim Law.
- 1784 : Pitts India Act. A Board of Control including Cabinet Ministers is appointed to supervise the affairs of the Company in India.
- 1785 : Resignation of Warren Hastings.
- 1786-1793 : Lord Cornwallis, the Governor-General of Bengal.
- 1790-1792 : The Third Anglo-Mysore War in which Tippu Sultan performed many astonishing feats but could not succeed against the English. Once again the British isolated Mysore by winning over the Marathas and the Nizam. The Treaty of Srirangapatnam (1792) resulted in humiliating terms to the Mysore ruler.
- 1792 : Ranjit Singh comes to power in a Sikh Misl (Group).
- 1793 : Lord Cornwallis introduces the Permanent Settlement in Bengal and Bihar.
- 1793-1798 : Sir John Shore, the Governor-General of Bengal.
- 1795 : The Dutch Company is finally expelled from its last possessions in India
- 1798-1805 : Lord Wellesley, the Governor-General of Bengal.
- 1798 : The Nizam of Hyderabad signs the first Subsidiary Alliance Treaty with Lord Wellesley.
- 1799 : The Fourth Anglo-Mysore War. In a fierce battle, Tippu Sultan dies fighting at Srirangapatnam. Restoration of a truncated Mysore to a heir of the old Hindu dynasty.
: Ranjit Singh captures Lahore and rises to prominence in the Punjab.
- 1801 : The Nawab of Avadh is forced to sign the Subsidiary Alliance Treaty.

- : The Company forces the Nawab of Carnatic to become a pensioner.
- 1802 : Treaty of Bassein in which the Peshwa Baji Rao II at Poona accepted the Subsidiary Alliance with the English Company. It provoked the other Maratha chiefs to commence the Second Anglo-Maratha War.
- 1803-1806 : The Second Anglo-Maratha War. The Company defeated the combined armies of Sindhia and Bhonsle in 1803 and forced them into Subsidiary Alliance. Gaekwad remained neutral. Finally Holkar was defeated in 1806 but the Treaty of Rajghat restored a major part of his territories.
- 1803 : The British army occupies Delhi and the Mughal Emperor is made a pensioner of the British.
- 1805 : *Cornawallis, the Governor-General of Bengal, a second time, Dies.*
- 1806 : Vellore Mutiny which is cruelly suppressed by the British officers.
- : The Company opens the East Indian Collège at Haileybury in England to train the Civil servants in India.
- 1807-1813 : *Lord Minto I, the Governor-General of Bengal.*
- 1809 : The Treaty of Amritsar between Ranjit Singh and the British. Ranjit maintained friendly relations with the British till his death.
- 1813-1823 : *Marquess of Hastings, the Governor-General of Bengal.*
- 1813 : The Charter Act. The Company's monopoly of trade in India is ended, except in tea and in trade with China.
- 1814-1816 : The Anglo-Gurkha War.
- 1817-1819 : The Third Anglo-Maratha War. The Peshwa renews hostilities with the British. The British defeat the combined armies of Peshwa, Bhonsle and Holkar. The Peshwa's kingdom

is annexed. Holkar and Bhonsle are forced to enter into subsidiary alliance. Gaekwad and Sindhia remain neutral. A new kingdom of Satara is created by the Company and a descendent of Shivaji is installed there as a nominal ruler.

- 1817-1818 : Suppression of Pindaris.
- 1823-1828 : *Lord Amherst, Governor-General of Bengal.*
- 1824 : The Barrackpore mutiny of Indian soldiers. Suppressed.
- 1828-1833 : *Lord William Bentinck, Governor-General of Bengal.*
- 1828 : Starting of the Academic Association by the Radical Indians.
- 1829 : The practice of Sati is banned through law.
- 1829-1837 : Suppression of Thugs in Central India.
- 1831 : Princely state of Mysore is annexed to the British India on the ground of mismanagement.
- 1833-1835 : *Lord William Bentinck, the first Governor-General of India.*
- 1833 : The Charter Act ends completely the Company's monopoly of Trade.
- 1833 : Centralisation of all legislative powers in the British India.
- 1833 : Law Commission under Lord Macaulay is appointed to codify Indian laws.
- 1835 : *Charles Metcalfe, Acting Governor-General of India.*
- 1835 : The Government of India decides in favour of western education through English for India.
- 1835 : Removal of Restrictions on the Vernacular Press by Metcalfe.
- 1836-1842 : *Lord Auckland, Governor-General of India.*
- 1838 : Formation of the Landholders Society by the upper class landlords of Bengal.
- 1839 : *Death of Ranjit Singh. Instability in Punjab.*
- 1839 : The Amirs of Sindh are forced to enter into subsidiary alliance with the British.

: The construction of the Grand Trunk Road from Calcutta to Delhi commences.

1839-1842 : The First Afghan War.

1842-1844 : *Lord Ellenborough, Governor-General of India.*

1843 : Sindh is annexed to the British Empire.

: Foundation of the Bengal British India Society by Dwarkanath Tagore with the help of the British political agitationist George Thompson.

1844-1847 : *Lord Hardinge, Governor-General of India.*

1845-1846 : First Anglo-Sikh War. The Punjab army is defeated and is made to sign the humiliating Treaty of Lahore.

: Jammu and Kashmir is placed in possession of Raja Gulab Singh.

1848-1856 *Lord Dalhousie, the Governor-General of India.*

1848-1849 : **The Second Anglo-Sikh War.** The Punjabis under Mulraj at Multan and Chattar Singh at Lahore were decisively defeated. **Punjab annexed to the British Empire.**

1848 : Annexation of Satara to the British Empire according to the Doctrine of Lapse.

1851 : The establishment of the British Indian Association by the landlords and the middle-class Radicals.

1852 : The Second Anglo-Burmese War.

: Formation of the Bombay Association by Dadabhai Naoroji and others for taking up political and public issues.

1853 : The first railway line between Bombay and Thana is opened. The first telegraphic line between Calcutta and Agra starts functioning.

: The Charter Act.

: Competitive Examination for the Indian Civil Service starts.


1854 : The Charles Wood despatch on education.

: Annexation of Nagpur and Jhansi according to the Doctrine of Lapse.

- 1855 : The Santhals in Bengal, revolt against the British rule and are suppressed.
- 1856-1858 : *Lord Canning, Governor-General of India.*
- 1856 : Annexation of Avadh to the British Empire on the ground of mismanagement by the Nawab.
: The British Indian Government passes the law to enable Hindu widow remarriage.
- 1857 : The first Universities in India established at Calcutta, Bombay and Madras.
: (May 10) **The commencement of the Revolt of 1857. The Sepoy Mutiny starts at Meerut.**
- 1857-1858 : The spreading of the Revolt and its suppression by the British rulers.
- 1858-1862 : *Lord Canning, Governor General and Viceroy of India.*
- 1858 : **The British Government takes over the administration of the British India from the East India Company.** The Proclamation of Queen Victoria, swearing non-interference in the social and cultural lives of the Indian people and in the affairs of the Princely States.
- 1859 : The uprising of the Indigo cultivators of East India. Enquiry Commission appointed. The Government accepts the recommendations of the Commission and terminates the system of compulsory cultivation of Indigo through the coercion of the European planters.
- 1861 : **Indian Councils Act.**
: Reorganization of administration according to the Portfolio system.
: Establishment of High Courts at Calcutta, Bombay and Madras.
: Enactment of the Indian Penal Code and the Criminal Procedure Code,
- 1862-1863 : **Lord Elgin, the Governor General and Viceroy of India. Dies suddenly.**

- 1862 : The British Indian Government's expedition against the Wahabis in the North-West.
- 1864-1869 : *John Lawrence, Governor General and Viceroy of India.*
- 1864 : Anglo-Bhutan war.
- 1865 : Opening of submarine telegraphy system between India and Europe.
- 1866 : The great Famine of Orissa.
- 1869-1872 : *Lord Mayo, Governor General and Viceroy of India.*
- 1870 : Founding of the Poona Sarvajanik Sabha by the politically-conscious Maharashtrians.
- 1871 : Mahadeva Govinda Ranade becomes the leader of the Sarvajanik Sabha.
- 1872 : Lord Mayo stabbed to death by a convict in an Andaman Island.
- 1872-1876 : *Lord Northbrook, Governor General and Viceroy of India.*
- 1873 : Dadabhai Nowroji gives evidence before the Select Committee of the British Parliament regarding the drain of wealth by the British rule in India.
- 1875 : The first visit of the Prince of Wales, the heir to the British throne, to India.
- : The trial and deposition of the Gaikwad of Baroda.
- 1876-1880 : *Lord Lytton, Governor General and Viceroy of India.*
- 1876 : Surendranath Benerjea and others found the Indian Association.
- : Reduction of the age limit for I.C.S. Examination to 19. Indians protest.
- 1877 : Surendra Nath Bonnerji tours India to awaken public opinion on political issues.
- : The Delhi Durbar and celebration of the Silver Jubilee of Queen Victoria's reign. **The Queen assumes the title of Empress of India.**

- 1878 : Creation of a Statutory Civil Service (Provincial Civil Service) in India for the recruitment of Indians to the top posts.
- 1878 : The vernacular Press Act passed inspite of Indians' opposition. Indian leaders protest against the Arms Act of 1878.
- 1879-1881 : Second Anglo-Afghan War.
- 1880 : The Liberal Party comes to power in England. Viceroy Lytton resigns.
- 1880-1884 : *Lord Ripon, Governor General and Viceroy of India.*
- 1881 : Repeal of the Vernacular Press Act.
- 1881 : Rendition of Mysore. The princely state of Mysore which had been taken over for management in 1831 is restored to a heir of the deposed native ruler.
- 1882 : The famous Resolution on local self-government Establishment of District Boards. Introduction of elective principle in local bodies.
- 1882 : Hunter Commission on Educational reforms.
- 1883 : **Ilbert Bill Controversy.** The Government withdraws the Bill bowing to the agitation by the Europeans in India.
- 1883 : Allan Octavian Hume addresses a letter to the graduates of the Calcutta University exhorting them to form a political Union.
- 1883 : **The first Indian National Conference at Calcutta organised by Surendra Nath Bannerji.**
- 1884-1888 : *Lord Dufferin, Governor General and Viceroy of India.*
- 1884 : Hume establishes the Indian National Union in consultation with the Indian leaders.
- 1885 : Some prominent leaders of Bombay like Pherozeshah Mehta, Badruddin Tyabji etc. form the Bombay Presidency Association to carry on political activities.

- : (December) The Second Indian National Conference organised at Calcutta under the auspices of the Indian Association of the middle classes, the British Indian Association of the landed gentry and the Central Mohamadan Association at Calcutta.
- : (December 25) **The Indian National Congress meets at the Sanskrit College at Bombay with 72 delegates under the inspiration of A.O. Hume with W.C. Bonnerji as President.**
- 1886 : Annexation of Upper Burma to the British Empire.
- : (December) The Second Annual Session of the Congress at Calcutta. Dufferin entertains the Congress delegates to a Tea, Party.
- : The appointment of the Public Service Commission (Aitchison Commission) for recruitment of Indians for public services.
- 1886-1894 : *Lord Lansdowne, Governor General and Viceroy of India.*
- 1887 : The Third Session of the Congress at Madras, the number of delegates 607. Syed Ahmed Khan opposes the Congress. The Governor of Madras entertains the Congress delegates.
- 1889 : The British Committee of the Indian National Congress set up at London with William Wedderburn as Chairman.
- 890 : Tilak becomes a political leader by opposing the Age of Consent Bill.
- 1892 : **The Indian Council Act. The principle of indirect election of the Council members conceded.**
- 893 : Tilak organizes the cow Protection Movement and revives the Ganapathi festival in Maharashtra.
- : Delimitation of Durand line between bani-
stan and British India (now Pakistan)

- 1894-1899 : *Lord Elgine, Governor General and Viceroy of India.*
- 1895 : British interference in Chitral affairs.
: Tilak inaugurates the Shivaji Festival in Maharashtra.
- 1896 : The Great Famine of India.
- 1897 : Shyamji Krishna Verma, the first revolutionary leader of India settles in London.
- 1898 : Tilak sentenced to 1½ years' rigorous imprisonment for incitement to murder.
- 1899-1905 : *Lord Curzon, Governor General and Viceroy of India.*
- 1903 : The publication of the first scheme of the partition of Bengal in the Indian Gazette.
- 1904 : Curzon visits Nawab Salimullah of Dacca and persuades him to support partition.
: The Universities Act which empowers the Government to control the affairs of the universities.
- 1905 : (July 7) The announcement of revised scheme of partition of Bengal by Curzon.
: (August 7) The meeting of Bengalis at the Town Hall in Calcutta to protest against the partition.
: **(October 16) Partition of Bengal comes into force.** Bengalis' protest in the form of Rakhi-bandhan ceremony under the inspiration of Rabindernath Tagore. **Starting of the Swadeshi and Boycott Movements.**
: (November) Establishment of the National Council of Education by Bengalis to organize a system of national education.
: The resignation of Lord Curzon over the controversy on the status of the military member vis-à-vis, the commander-in-Chief of the Indian Army.
: Annual Session of the Congress at Banaras in which there were the first signs of the split.

between the Nationalists and the Moderates on the proposal to approve the Boycott Movement. The Moderates prevail.

- : Liberal Party comes to power in England.
- : Russia defeated by Japan.
- : Founding of the Indian Home Rule Society at the Indian House by Syamji Krishna Varma.

1905-1910 : *Lord Minto (II) Governor-General and Viceroy of India.*

1906 : Starting of the periodical Yugantar (New Era) preaching rebellion by Barindra Ghosh.

- : The Annual Session of the Congress in Calcutta under the presidentship of Dadabhai Naoroji. **The Congress proclaims Swaraj as the goal of India.** Still the Moderates prevail.

- : The provincial conference at Barisal to protest against Partition. Police atrocities on the responsible national leaders.

- : (December 31) Foundation of the Indian Muslim League at Dakha.

1907 : (December) **The Congress split at its Annual Session at Surat.** The tussle between the Moderates and the extremists regarding the choice of the president. The Moderates prevail, Rash Behari Ghosh becoming the president. Tilak and others walk out of the Congress.

- : The first Annual Session of the Muslim League at Karachi.

- : Serious communal riots at Commilla in East Bengal.

- : Hoisting of the National Flag of India at the International Socialist Congress at Stuttgart by Madame Cama.

- : The Anglo-Russian convention regarding the status of Afghanistan.

1908 : (April) The convention Committee of the Congress drafts the Congress constitution.

- : (December) . The Congress constitution adopted at the annual session of the Congress at Madras.
- : Aravinda Ghosh arrested. **Tilak sentenced to six years' deportation** at Mandalay on the ground of seditious writing in 'Kesari'.
- : Bomb attack on an European official's carriage by Prafulla Chaki and Khudiram Bose.
- : The District Magistrate of Tirunelveli (Tamil Nadu) shot dead by the revolutionary youth, Vanjinathan.

1909

- : **Minto-Morley Reforms. Indian Councils Act of 1909.**
- : Madanlal Dhingra, a revolutionary youth shoot dead Curzon Wylie.

1910-1916

- : *Lord Harding, Governor General and Viceroy of India.*

1911

- : Visit of King George V to India. Delhi Durbar. **Annulment of the Partition of Bengal.** Announcement of the transfer of imperial capital of Delhi.

1912

- : The Hindu-Muslim Conference at Allahabad under the leadership of G.K. Gokhale.
- : **Transfer of Capital to Delhi.**

1913

- : The Viceroy injured in a bomb attack during his state entry into Delhi.
- : The annual session of the Muslim League at Lucknow, expressing the desire for cooperation with the Congress.

1914

- : **Launching of the Ghadar Party** at a meeting of Indians at San Francisco (USA) and the publication of the weekly journal Ghadar (Rebellion).
- : 'The German Union of Friendly India' is established in Germany to support the Indian revolutionaries for the independence of India.
- : The Komagata Maru episode. The Punjabis returning from Canada by the chartered Japanese

vessel, Komagata Maru were fired upon without justification by the police.

- 1914-1918 : The First World War.
- 1915 : The Defence of Act India passed.
- : The Maveric tanker plot' fails.
- : Following the failure of the Maverick Plot, Jatin Mukherji dies fighting the police on the bank of R. Buri Balam (Orissa).
- : The mutiny of the Fifth Light Infantry, the Indian battallion at Singapore. The mutiny was suppressed after three days.
- : Establishment of a Provisional Government of India at Kabul with Raja Mahendra Pratap as President and Maulana Barkatullah as Prime Minister.
- : Death of Gokhale and Pherozeshah Mehta. A severe blow to the Moderates.
- : Annie Besant announces the decision to start the Home Rule League.
- : **Gandhi returns to India from South Africa and settles at Sabarmati Ashram.**
- : (December) The annual Congress session at Bombay disapproves of the proposal for the Home Rule League.
- : (19 February) The date fixed for simultaneous uprising and rebellion of some regiments of the Indian army, organised by Rash Bihari Bose and his friends. The Government gathered intelligence and acted swiftly to prevent the mutiny.
- 1916-1921 : *Lord Chelmsford, Governor-General and Viceroy of India.*
- 1916 : Appointment of the Sadler Commission to review the working of the Calcutta University.
- : (April) **Tilak starts the Home Rule League outside the Congress with Joseph Baptista as president.**

- : (September) **Besant establishes her Home Rule League.**
 - : (December) **The Congress reunion and Luuknow Pact** at the annual session of the Congress in which the nationalists leaders are admitted after a suitable amendment to the Congress constitution. The annual session of the Muslim League also at Lucknow at the same time. The agrément between the Congress and the League approved.
 - : The Non-Brahmin Movement in Madras under Dr. Nair starts.
- 1917
- : Gandhi's threat to the Government, that he would launch a Satyagraha if the system of indentured labour for British Colonies was not abolished, has the desired effect.
 - : Gandhi's Champaran Satyagraha resulting in the first triumph for the Gandhian technique. Gandhi's Satyagraha campaign in Kaira District of Gujarat for suspension of land revenue.
 - : The leader of the Gadhar Party in U.S.A., Chandra K. Chakravarty and others arrested. The subsequent trial resulted in the disbanding of the Party.
 - : Besant and other national leaders in Madras interned. The Home Rule Movement spreads.
 - : (August 20) **Montagu, the secretary of State for India makes the historic announcement on steps for establishing responsible Government in India.** The Congress and the Muslim League drop the programme of passive resistance. Mrs. Besant drops the Home Rule Movement.
 - : (November) **Montagu Mission to India.**
 - : (December) **The Congress session at Calcutta under the presidentship of Mrs. Besant, a great triumph for the Home Rule Movement.**

- 1918 :
- : The Home Rule delegation led by Tilak is prevented from going to England by the arrest of the leaders at Madras.
 - : Montagu Chelmsford Report drafted.
The Labour Party Conference in Britain passes the Resolution in favour of Home Rule for India.
 - : (August) The special session of the Congress in Bombay with Hasan Iman as the president witnesses sharp differences between the old Moderates and the Nationalists in the Congress over the acceptance of the Montford Reforms. The Moderates walk out to form the All-India Liberal Federation under the presidentship of Surendranath Bonnerji.
 - : (December) The annual session of the Congress at Delhi with Pandit M M. Malaviya as president.
- 1919 :
- : The delegates of the Home Rule League and the Congress visit London to canvass support for India's cause.
 - : **An important landmark in the history of British India.**
 - : (March) **The Rowlatt Act** (The Anarchical and Revolutionary Crimes Act) as recommended by the Sedition Committee, headed by Justice Rowlatt passed.
 - : (6 April) **All-India strike organised by Mahatma Gandhi.**
 - : (13 April) **The Jallianwala Bagh Tragedy.** Brigadier-General Dyer opens fire at Jallianwala Bagh in Amritsar, killing hundreds of people.
 - : (15 April) Martial law proclaimed in Punjab. Atrocities committed by the martial law regime, headed by Lieutenant-Governor Michael O'Dwyer.

- : (18 April) **Gandhi suspends the Satyagraha campaign following large-scale disturbances in Punjab and Ahmedabad.**
- : (June) Appointment of the Congress Committee to inquire into the occurrences in the Punjab.
- : (October) The appointment of the Hunter Committee by the Government to inquire into the Punjab disturbances.
- : (November) Gandhi elected as the president of All-India Khilafat Conference at Delhi.
- : (December) **The Government of India Act, 1919 receives the royal assent**

1920

- : **Mahatma Gandhi takes over the leadership of the Congress.**
- : (March) The Congress Committee of inquiry into the Jallianwalla Bagh incidents gives its unanimous report recommending dismissal of the Viceroy Chelmsford, the Lieutenant-Governor O'Dwyer, Brigadier-General Dyer and others.
- : (May) Hunter Committee submits the report, according to which the British Government censored Dyer.
- : (August) Gandhi gives a call for a general All-India strike on behalf of the Central Khilafat Committee.
- : **Death of Tilak.**
- : (September) The special session of the Congress at Calcutta, presided over by Lala Lajpat Rai. Disagreement on launching the Non-Cooperation movement.
- : (November) Boycott of the Prince of Wales during his visit to India. Disturbances at Bombay. The Government declares the Congress an unlawful association.
- : **Elections to the Legislative Councils.**

- : (December) **The annual session of the Congress at Nagpur under the presidentship of Vijayaragavachari, approves the launching of the Non-Cooperation Movement.**
- 1921 : Agrarian riots in Uttar Pradesh. **Moplah rebellion.** The Moplahs (Muslim peasants) in Malabar declare Swaraj after paralysing the administration. The rebellion suppressed by the end of the year after the massacre of thousands of people.
- : (3 January) The inauguration of the new Constitution according to the Government of India Act, 1919.
- : (1 February) Gandhi decides to embark on mass civil disobedience at Bardoli and issues an ultimatum to the Viceroy.
- : (5 February) **The Chauri Chaura incident.** The mob reacting to a police firing on Congress volunteers burns to death 22 policemen. **Gandhi suspends Civil Disobedience Movement.**
- : (March) **Gandhi arrested and later sentenced to 6 years' simple imprisonment. The end of the first phase of the Non-Cooperation Movement.**
- 1921-1926 : *Lord Reading Governor General and Viceroy of India.*
- 1922 : The annual session of the Congress at Gaya with C.R. Dass as president, refuses to endorse the council-entry plan of C.R. Dass and Motilal Nehrū. The Swaraj party within the Congress is formed.
- 1923 : (September) The special session of the Congress at Delhi effects a compromise between the Swarajists and the No-changers in the Congress.
- : Serious communal riots between Hindus and Muslims in Multan, Amritsar and other places.

- : (November) Elections to the Legislative Council held. The Swaraj Party wins an impressive number of seats in different Councils and in the Legislative Assembly of India. The Liberal Party of veteran national leaders completely routed in the elections.

1924 : Gandhi released from jail owing to his ill-health.

- : (December) The annual session of the Congress at Calcutta.

The death of C.R. Dass. His efforts to bring about a settlement between the Government and the Congress end prematurely.

- : Major communal riots at Gulbarga (Hyderabad state) and Kohat (N.W.F.P.) Gandhi undertakes a 21-day fast by way of penance for communal riots.

1925 : (December) The annual session of the Congress at Kanpur. Motilal Nehru gives a commitment regarding withdrawal of the Swarajists from the Councils by February 1926.

1926 : The Swarajists walk out of the Legislative Assembly. But some of the Swarajists decide to form an Independent Congress Party on the programme of responsive cooperation with the Government. The end of the Swaraj Party.

The abolition of Caliphate by Kemal Pasha and hence the end of the Khilafat cause.

- : Muslim League meets at Nagpur under the presidentship of Mohammed Ali Jinnah after a lapse of 4 years. Jinnah announced his Four-Point programme for cooperation with the Congress.

- : The first all-India Non-Brahmin Conference held at Belgaum under the presidentship of A. Ramaswamy.

- 1926-1931 : *Lord Irwin, Governor General and Viceroy of India.*
- 1927 : (November) The appointment of the Simon Commission. (The Statutory Commission).
- 1928 : (February) **Simon Commission lands in India. All-India Closure (Hartal). The Commission is boycotted everywhere with slogan "Simon, Go Back".**
- : (May) Taking the challenge posed by the Secretary of State for India that Indians could not produce an agreed Constitution, an All-Party Conference in Bombay decides to appoint a committee under the chairmanship of Motilal Nehru to draft a Constitution.
- : (August) The Nehru Committee Report prepared.
- : (December) The All-Party Conference meets at Calcutta to consider the report. The Muslim League under Mr. Jinnah refuses to endorse the Nehru Report.
- : Assault on Lala Lajpat Rai in Punjab during the boycott of the Simon Commission.
- 1929 : The commencement of the trial of the 'Meerut conspiracy case' involving leaders of the Communist Party of India.
- : (March) **The Muslim League meeting at Delhi at which Jinnah announces his 14-Point demand.**
- : Change of Government in Britain. Labour Party headed by Ramsay Mac Donald comes to power.
- : (October) Viceroy Lord Irwin announces the policy of the British Government to convene a Round Table Conference at London.
- : (December) **The Indian National Congress meeting at Lahore under the presidentship of Jawaharlal Nehru, passes the resolution that the object of the Congress is the**

attainment of Poorna Swarajya (complete independence). The Congress decides to launch another Civil Disobedience Movement.

- 1930 : (26 January) The Congress observes Indian Independence Day.
- : (12 March) Gandhi starts the Civil Disobedience Movement with the famous Dandi March for Salt Satyagraha.
- : The Simon Commission Report is published.
- : (November) The First Round Table Conference in London meets without the participation of the Congress.
- 1931-1936 : *Lord Willington, Governor General and Viceroy of India.*
- 1931 : (March) Gandhi-Irwin Pact. The release of political prisoners. Gandhi withdraws the Civil Disobedience Movement and decides to take part in the Second Round Table Conference as the sole representative of the Congress.
- : (December) The Second Round Table Conference fails to arrive at a settlement.
- : The Congress declared illegal and Gandhi re-arrested on his arrival in India.
- 1932 : (August) Ramsay Mac Donald announces the Communal Award.
- : (September) The Poona Pact between Gandhi and Ambedkar and other scheduled casts' representatives. Modification of the Communal Award.
- : (November) The Third Round Table Conference without the participation of the Congress ends without any settlement.
- 1933 : The British Government issues the White Paper on India.
- : Several Communist Party leaders found guilty and sentenced in the Meerut conspiracy case.

- 934 : The Congress formally ends the Second Civil Disobedience Movement.
- 935 : The Government of India Act of 1935 passed.
- 936-1944 : *Lord Linlithgow, Governor General and Viceroy of India.*
- 937 : Provincial autonomy according to the Government of India Act. 1935 comes into force.
- : Elections held. The Congress Ministries formed in 7 provinces.
- 939-1945 : The Second World War.
- 939 : Formation of the Forward Block by Subash Chandra Bose.
- : (3 September) World War II breaks out. Viceroy declares India a belligerent country.
- : (14 September) The Congress passes a resolution refusing to co-operate with the Indian Government's War efforts unless certain conditions are fulfilled.
- : (17 October) The Viceroy issues a statement outlining certain concession. **The Congress rejects the Viceroy's statement and directs the Congress Ministries in the Provinces to resign.**
- : (22 December) The Muslim League observes the 'Day of Deliverance' from the 'tyranny' of the Congress rule at the instance of Jinnah.
- 940 : (March) **Jinnah announces publicly the demand for Pakistan based on the theory of two nations.** The Congress offers conditional cooperation to the Government in the War efforts on fulfilment of certain conditions. The Government rejects the Congress offer.
- : (8 August) Viceroy Linlithgow makes the statement known as the **August offer of 1940.** The offer outlines the proposals of the British Government regarding long-term measures.

after the termination of the War and interim steps for the duration of the War. The Congress rejects the offer on the ground that dominion status for India after the War was not acceptable to the Indians.

1941

- : The Congress organises the programme of Individual Satyagraha. Starting with Vinoba Bhave and Jawaharlal Nehru, the number of satyagrahis in jail increases to 30,000 persons.
- : The U.S. President Roosevelt and the Chinese leader, Chiang Keishek exert pressure on the British Government for solving the deadlock between the Government and the political leaders in India.
- : The Japanese attack on Pearl Harbour in USA.

1942

- : (March) Rangoon falls to the Japanese army. The British Government realizes the need for breaking the political deadlock in India.
- : (March) **Cripps Mission.** Stafford Cripps comes to India and starts negotiations with the Indian leaders.
- : (March) The British Government announces the Draft Declaration containing the Cripps proposals relating to long-term and interim settlement.
- : (April) **The Congress President, Maulana Azad rejects the Draft Declaration.**
- : (July) The Congress Working Committee passes the 'Quit India' Resolution.
- : (8 August) **The passing of the 'Quit India' Resolution at the All-India Congress Committee meeting at Bombay.**
- : (9 August) Gandhi is arrested in the early morning. The Government decides to suppress the Congress. Soon violence break out and

about one lakh national leaders and freedom fighters are imprisoned. The 'Quit India' Movement in full swing for a few months.

- : (12 August) **Cripps leaves India on the failure of his Mission.**

1943-1947 : *Lord Wavell, Governor General and Viceroy of India.*

1944 : (May) *Gandhi released from prison unconditionally on medical grounds.*

- : (September) Gandhi meets Jinnah to discuss the C. Rajagopalachari Formula. The talks fail after 18 days of negotiation.

1945 : Viceroy Wavell organises the Simla Conference, inviting prominent Indian leaders to discuss the **Wavell Plan**. The Conference ends in a deadlock on the question of representation of Muslims in the proposed new Executive Council of the Viceroy.

- : (July) The Labour Prime Minister Mr. Attlee forms a new Government in Britain.

- : (November) **The trial of the I.N.A. prisoners.** The Congress Party fully defends the I.N.A. undertrials. All of them are convicted but their sentences are suspended because of pressure of the Indian public opinion.

1946 : (September) **Interim Government with Jawaharlal Nehru as Vice-President of the Executive Council of the Viceroy is formed.**

- : (October) Muslim League joins the Interim Government and creates problems in the smooth working of Government.

- : (9 December) **Opening of the Constituent Assembly of India.** Muslim League boycotts the Assembly.

1946 : (18 February) The mutiny of the Navy men at Bombay. The mutiny was contained only after 5 days.

- : (24 March) **The Cabinet Mission consisting of Lawrence, Cripps and A.V. Alexander comes to India.**
- : (16 May) **The Cabinet Mission Plan is announced. The long-term constitutional settlement is accepted, by and large, by all political parties.**
- : (16 June) **The Cabinet Mission outlines the procedure for forming the Interim Government.**
- : (July) **Elections to the Constituent Assembly as provided in the Cabinet Mission Plan. In the elections, the Congress captures 199 of the 210 general seats.**
- : (29 July) **Muslim League withdraws its acceptance of the Cabinet Mission Plan and calls for direct action to achieve Pakistan.**
- : (14 August) **Jawaharlal Nehru is invited to form the interim Government at the centre.**
- : (16 August) **The 'Direct Action' day, observed by the Muslim League results in massacre of thousands of people in Calcutta, Noakhali and Bihar.**

1947-1948 : Lord Mountbatten, the last Governor and Viceroy of India.

- 1947**
- : (20 February) **The British Prime Minister Attlee makes the statement expressing the British Government's intention to transfer power to responsible Indians before 3 June 1948.**
 - : (February) **Mountbatten becomes the Governor General of India.**
 - : (3 June) **Mountbatten announces the plan of partition of India.**
 - : (June) **The Congress and the Muslim League accept the Mountbatten Plan.**

- : (4 July) The Indian Independence Bill is introduced in the British Parliament.
- : (18 July) The Indian Independence Act comes into force.
- : (15 August) The 'appointed day' when India becomes independent and Pakistan comes into existence.
- : Lord Mountbatten, first Governor-General of India and Mohammed Ali Jinnah, the first Governor-General of Pakistan.
- : Large-scale communal riots following the Partition. Serious refugee problem along western and eastern borders.
- : The State of Jammu and Kashmir accedes to India following the infiltration of Pakistani troops into parts of Kashmir (October 1947).
- 1948 : **Assassination of Mahatma Gandhi** (January 30).
- : Rajagopalachari becomes the Governor-General of India.
- : Integration of Hyderabad State into India (September).
- 1949 : **The Constituent Assembly adopts the new Constitution of India** (November 26).
- 1950 : **The Constitution comes into force** (January 26).
- : Sardar Patel, the Deputy Prime Minister of India dies.
- 1951 : The Planning process initiated with the First Five Year Plan.
- 1952 : **The First General Election in India.** Dr. Rajendra Prasad becomes the first President of India.
- 1953 : The State of Andhra Pradesh inaugurated following agitation for the bifurcation of the Madras State.

1.54

1954 : **French territories in India incorporated with India as the Union Territory of Pondicherry.**

: China signs the Panchsheel Agreement with India.

1955 : The Avadi session of the Indian National Congress adopts the socialistic pattern of society as its goal.

1956 : **Reorganisation of states following the recommendations of the States Reorganisation Commission.**

: Nationalisation of Life Insurance.

1957 : Second General Elections in India.

1958 : Metric system of weights and measures introduced in India.

1959 Occupation of Tibet-China starts border disputes with India.

1960 : Bombay State bifurcated into Maharashtra and Gujrat.

1961 : **Integration of Goa, Damon and Diu in India.**

1962 : Third General Elections. Dr. S. Radhakrishnan becomes President.

: **The Chinese invasion of India (October).**

1963 : The first Indian rocket launched from the Thumba Station.

1964 : **Death of Jawaharlal Nehru-Lal Bahadur Shastri becomes Prime Minister.**

1965 : **Indo-Pakistan War in the Rann of Kutch and cease-fire (June).**

1966 : Tashkent meeting between Lal Bahadur Shastri and Gen. Ayub Khan-Declaration of peace.

: **Death of Shastri-Indira Gandhi becomes the Prime Minister.**

: Devaluation of the Indian rupee.

: The States of Punjab and Haryana come into being.

- 1967 : Fourth General Elections in India. Dr. Zakir Husain becomes the President.
- 1969 : Husain's death. V.V. Giri becomes the President. The Congress Party splits.
: Fourteen leading banks are nationalized.
- 1971 : **Indo-Soviet Treaty of Peace, Friendship and Cooperation**,
: The mid-term polls to Lok Sabha (Fifth General Elections).
: **Indo-Pakistan War**, following the influx of refugees from East Bengal (December).
- 1972 : Indo-Bangladesh treaty of peace, friendship and cooperation signed with Mujibur Rahman. Simla agreement between India and Pakistan (July).
- 1974 : Atomic explosion at Pokharan (May 18).
: Fakhruddin Ali Ahmed becomes the President.
- 1975 : Aryabhata, the Indian satellite launched (April 19).
: Declaration of Internal Emergency in India (June 25).
: The announcement of 20-Point Economic Programme.
: Sikkim becomes a State of India.
: Delinking of the Indian rupee from pound sterling.
- 1976 : The Constitution 42nd (Amendment) Act passed.
- 1977 : Sixth General Elections to the Lok Sabha (March). Morarji Desai becomes the Prime Minister of India.
: Death of Fakhruddin Ali Ahmad. Sardar Reddy unanimously elected President.
: Janata Party launched.
- 1978 : Constitution (44th Amendment) Bill passed in the Parliament.

- 1979 : Instability of the Government at the Centre. Lok Sabha dissolved.
- 1980 : Seventh General Elections to the Lok Sabha. Indira Gandhi becomes the Prime Minister the second time.
- : Indian satellite launch vehicle SLV-3 successfully launches Rohini Satellite.
- : Sixth Five-Year Plan starts. Six Banks nationalised.
- 1981 : Bearer Bond Scheme.
- : APPLE, India's telecommunication satellite made operational.
- : India's first scientific expedition to the Antarctica.

2

Names and Terms in Indian History

Archaeology : The science which studies excavations in order to build up the history, particularly the social and cultural history, of the people in the remote past.

✓ *Numismatics* : The study of coins from the point of view of history.

✓ *Epigraphy* : The study of inscriptions on stones, copper plates, coins, seals etc.

✓ *Palaeography* : The study of ancient writings found in inscriptions, palm leaves and other records.

Megaliths : The structures using big stones, particularly for the burial of the dead. The culture associated with it is known as Megalithic Culture.

Jatakas : The folk tales connected with the life and earlier births of Buddha.

Indika : The historical account written by Megasthenes, during the 4th B.C. It is now available only in parts and some of its narrations are full of exaggerations.

Palaeolithic Age (Old Stone Age) : The period when human beings were using unpolished rough stones as tools. Extended from 5,00,000 B.C. to 8000 B.C.

Neolithic Age : (New Stone Age) : The period when people used tools and implements made of polished stones. Extended from 8000 B.C. to 1000 B.C. or even later in certain areas.

Chalcolithic Age (Stone-Copper Age) : The period when human beings were using tools made of copper along with the

stone implements. The ware associated with this period is white-painted 'Black-and-Red'.

Jorwe Culture : The culture associated with the people belonging to the period of the excavations found at Jorwe in Maharashtra. Typical Chalcolithic culture.

Microliths : Small-sized stone tools, generally associated with the advanced phase of Neolithic Age or Chalcolithic Age.

Copper Age : The period when certain human settlements were making use of copper on a large scale because of easy availability. The pottery associated with it is ochre-coloured and the period assigned to it is 2000 B.C. to 1800 B.C. It is interesting to note that nowhere in India did this phase last for more than a century.

Bronze Age : The period when people were using bronze implements and vessels. Bronze is got by mixing small quantities of tin with copper. The bronze culture was superior to the culture of the Copper Age.

Iron Age : The period when people began the use of iron implements and tools. In India, it started in the Eastern Gangetic Plain, around 6th century B.C.

Civilization : The totality of the material conditions of life of the people in a community or area. Generally the term is associated with the territories where, in the past, advanced material conditions prevailed in remarkable contrast to the surrounding geographical areas. Tools, implements, occupations and weapons are some of the indicators of the state of civilization of a people. The earliest known civilizations are Egyptian, Sumerian, Harappan, and Babylonian.

Culture : The sum total of the material and mental development of a people or community, expressed in the beliefs, philosophy, fests, arts, dress, food and other conditions of life.

Harappan Civilization : Also known as Indus Civilization, because the original excavations were on river Indus. The Harappan culture prevailed in an extensive area extending from Kashmir to Gujarat and from Sindh to Uttar Pradesh.

Nearly 250 sites are associated with this culture, out of which six were cities at Harappa (Punjab), Mohenjo-daro (Sindh) Chanhudaro (Sindh), Lothal (Gujarat), Kalibangan (Rajasthan), Banawali (Haryana). The period assigned 2500 B.C. to 1750 B.C. Its mature phase was between 2200 B.C. and 2000 B.C. Harappa and Mohenjo-daro disappeared around 1750 B.C. The port cities are Lothal (Gujarat), Sutkagendor (Sindh) and Surkotada (Saurashtra). Noted for its system of town planning in the cities of this civilization. The Great Bath of Mohenjo-daro and 6 granaries of Harappa are important structures. The drainage system of Mohenjo-daro was very impressive. Use of burnt bricks and bronze tools and weapons along with stone implements. Cultivation of crops like wheat, barley, peas, sesamum and mustard. The earliest people to produce cotton. Domestication of animals like oxen buffaloes, goats, sheeps, pigs, dogs, cats, asses, camels and humped bulls. Horse not used. Cotton weaving developed. Practised boat-making. Experts in bead-making and jewellery using silver, gold and precious stones. No trace of currency or metallic money. Use of wheels and bullock carts. Commercial links with Rajasthan, Afghanistan and Iran. No definite ideas about their political organization. No temples or priests. Terracotta figurines of goddesses including the mother-goddess. The principal male deity. Pasupati depicted in a seal. Phallus worship, tree and animal worship. Harappan script not yet deciphered satisfactorily. The script pictographic, not alphabetical. Use of weights and measures. A large number of seals depicting pictures of animals. Use of toys made of terracotta. No definite conclusions regarding the sudden end of the Harappan culture. After the cities were destroyed, the villages having Harappan civilization still flourished for a long time.

Terracotta : Fire-baked earthen clay used to make toys and images.

Rig Vedic Age : The advent of Aryans from the Alps region of Europe in different hordes starting from 2000 B.C. Passed through Iran and hence many features common between Indo-Iranians of this period and Rig Vedic Aryans. Aryans appear in India about 1500 B.C. Initially settled in villages in the

region of the Indus and its tributaries. Many tribal conflicts between different tribes and clans of Aryans and fight against non-Aryans i.e. original inhabitants. Used horses and chariots extensively. Cultivated agriculture in the primitive form. Doubtful whether they used bronze. Basically pastoral people. Used cow as a measure of wealth. Houses made of mud. The tribal polity centered around the king whose post was hereditary. Kinship was the basis of social structure. Women participated in assemblies. The institution of marriage well established. Existence of slavery. Social divisions based on occupations just started. The main Rig Vedic Gods, Indira and Agni. Female deities also. Sacrifice and rituals used.

Later Vedic Age : The period assigned 1000 B.C. to 600 B.C. Painted Grey Ware culture. Later Vedas, Brahmanas and Upanishads. The war referred to in Mahabharata might have happened during this period. Diversification of arts and crafts. Rice used in rituals. The development of village and small towns. The early towns were Hastinapur and Kausambi. Increasing royal power. Development of small states, replacing tribal polity. Development of the Varna system with clear rules of social division. Appearance of the institution of gotra. Important gods of this period, Rudra and Vishnu. Increase in animal sacrifices in the rituals. Increasing importance to Brahmins. The reaction to the priestly domination started around 600 B.C.

Rig Veda : The oldest of the four Vedas, composed around 1500-1600 B.C. when the Aryans lived in the Indus region. Has many things in common with Avesta, the holy book of the Parsees and the oldest book in the Persian language. The Vedas were composed in Sanskrit and were written down using Devanagari script much latter.

Sama Veda : The prayers of the Rig Veda were set to tune and this modified collection was known as Sama Veda.

Yazur Veda : Consists of hymns and rituals to be performed along with the recitation of hymns.

Atharva Veda : Deals with magic rites and charms based on beliefs and practices of non-Aryans in whose midst Aryans lived.

Samhitas : The collections of the hymns in the Vedas (without commentary).

Brahmanas : The commentaries and texts which accompanied the Samhitas, full of rituals and formulae. Composed around 1000-600 B.C.

Upanishads : The philosophical texts written after 600 B.C. criticizing rituals and placing emphasis on different kinds of knowledge and philosophies.

Mahabharata : One of the two principal epics of Aryans in India, composed finally around 400 A.D. The other, Ramayana, is of later origin.

Land of the Seven Rivers : That part of India which was inhabited by the Rig Vedic Aryans in village settlements. The rivers included the Sindh, its five tributaries and the Saraswathi (a river now lost in the sands of Rajasthan).

Dasas : The name given to the original inhabitants of Indian by the Rig Vedic Aryans. They appear to be the Aryan hordes who had settled in the Indus region earlier than the Rig Vedic Aryans.

Dasyus : The name given to the non-Aryan original inhabitants in and around the Indus region occupied by the Rig Vedic Aryans.

The Battle of Ten Kings : The battle mentioned in the Rig Veda. Appears to have taken place between the Bharatas, the oldest of Rig Vedic Aryan tribes and the combined forces of 10 kings, five Aryan and the remaining non-Aryan.

Painted Grey Ware (P.G.W.) Culture : The culture of the people who used earthen bowls and dishes made of painted grey pottery. The use of iron weapons is generally associated with this culture.

Samiti : In the Vedic Aryan societies, this was the tribal assembly which advised the king. Other such assemblies were Sabha, Vidatha and Gana.

Varna : A system of social division in the Later Vedic society based on occupational pattern in the society. Later it developed into pernicious caste system based on birth.

Gotra : The social institution which recognised the common ancestry of a set of nuclear families which generally lived together. Gotra exogamy was practiced at the beginning.

Ashramas : The four stages of life, worked out during the post-Vedic period. The stages are students (Brahmachari), householders (Grihastha), partial retirement (Vanaprastha) and complete retirement (Sanyasa).

Punch-marked Coins : The coins of the earliest variety in India which were issued around the 5th century B.C. in the small kingdoms of the Gangetic plain.

Lichchhavi : A clan of the Aryans who established a sort of republic in the 6th century B.C. with their capital at Vaisali (the village Basarhi) in Bihar.

Mahavira : Vardhamana Mahavira, later known as the Jina (conqueror) and considered as the 24th Thirthankar of the Jains lived in the 6th and 5th centuries B.C. He preached Jainism with the 5 doctrines, prohibiting violence, lie, theft, acquisition of property and self-indulgence.

Svetambaras : A sect of the Jains whose members put on white dress.

Digambaras : The other sect of Jains in which the priests keep themselves naked following the example of Mahavira.

Basadis : The Jain monasteries parallel to the Sanghas of Buddhists. However they were established only in Karnataka after the 3rd century A.D.

Buddha : Gautama Buddha (Siddharta) lived in 6th and 5th centuries B.C. and was a contemporary of Mahavira for some time. Son of Sudhodhana, the ruler of Kapilavasthu. Attained Nirvana and perfect knowledge at the age of 35 under a pipal tree at Bodhi Gaya. Founder of Buddhism. Established the Buddhist order of Sangha.

Prakrit : The literary language in the Gangetic Plain during the Ancient period. The early Jains and Buddhists wrote in that language.

Ardhamagadhi : The language in Magadh in which the religious literature of the Jains were originally written.

Dhamma : The path to be followed by the Buddhists in their life. The principal tenets of Dhamma were codified and popularised by Asoka through pillar inscriptions. The philosophical expositions of Dhamma were later written by the Buddhist scholars.

Mahajanapadas : The 16 large states of Aryans that rose in the Gangetic Plain during the 6th century B.C.

Haryanka Dynasty : Ruled the Magadh kingdom and later produced powerful rulers like Bimbisara and his son, Ajathasatru, who established the first empire in India in the 6th century B.C.

Bimbisara : He is the first remarkable historical king of the Aryans. Ruled Magadha with capital at Rajgir.

Ajathasatru : The son and successor of Bimbisara. Built the imperial city of Pataliputra.

Sisunnaga Dynasty : The dynasty that succeeded the Haryankas in Magadh in the 5th century B.C. (Capital : Pataliputra).

Nanda Dynasty : Rule Magadha in the 5th and the 4th century B.C. till it was overthrown by Chandra Gupta Maurya. Produced the most powerful rules in the Gangetic Plain and paved the way for the establishment of the Mauryan Empire. (Capital : Pataliputra).

Darius I : The Emperor of Persia who established the first Indian Satrapy in the Punjab and Sindh.

Brahmi : The script which prevailed in North India and the Deccan during the Ancient period. Written from left to right. Asokan inscriptions were written in Brahmi script.

Kharosthi : The script of the Iranians which was used in North-West India during the Mauryan empire. A result of the Indian gravian (Persian) invasion of India.

Alexander : The ruler of Macedonia in Greece who embarked on a career of conquest and invaded India for some time in 326-325 B.C. His conquests in India did not have permanent effects.

Poros : Also known as Purushothama, this king of the Punjab was defeated but later honoured by Alexander.

Arrian : The Greek historian who has written in detail on Alexander's campaigns in India.

Northern Black Polished (N.B.P.) Ware : This was a glossy shining type of pottery that was made in Northern India from 6th century to 3rd century B.C. The N.B.P. phase resulted in the beginning of the second urbanisation in India and was associated with the use of burnt bricks and metallic money.

Pali : The language of the masses in the Gangetic Plain during the Ancient Period. Buddha preached in Pali and the earliest Buddhist scriptures were also written in that language.

Seleucus Nikitar : A General of Alexander's army who carved out a kingdom for himself in North-West India and Persia after death of Alexander. He was defeated by Chandra Gupta Maurya and later maintained friendly relation with him.

Pliny : A Latin historian who wrote 'Natural History'. He gives an account of the conditions of Mauryan Empire.

Mauryan Dynasty : The dynasty founded by Chandra Gupta Maurya. During the period of Asoka, the dynasty established one of the biggest empires in the history of India.
(Capital : Pataliputra)

Kautilya (Alias Chanakya) : Counsellor and Minister of Chandra Gupta Maurya. Known as India's Machiavelli. His famous work 'Arthashastra' (Statecraft).

Bindusara : The son of Chandra Gupta Maurya and father of Asoka, the Great.

Asoka : During his reign, the Mauryan empire reached the maximum extent to cover the bulk of Northern and Central India. His conversion to Buddhism after witnessing the disastrous effects of the Kalinga War in 261 B.C. Did his best for the propagation of Buddhism in India and abroad. Known for the application of Dhamma to statecraft. Hailed

as a unique emperor of the Ancient Period because of his tolerance and welfare administration.

Sunga Dynasty : Established by Pushyamitra Sunga, who overthrew the last Mauryan King in 187 B.C. Lasted till 75 B.C.

Kanva Dynasty : The dynasty that replaced the Sungas in Magadh and ruled till 30 B.C. After them the Maghadh empire disintegrated completely.

Kharavela : The best-known king of Kalinga (Orissa) who ruled in the first century B.C. The Kalinga empire established by this Jain King, disintegrated soon after his death.

Scythians : Nomadic hordes of foreigners who posed a threat to India from the Central Asia in the 3rd century B.C. They were responsible for pushing the Greeks towards Northern Afghanistan (Bactria), and the Parthians and the Sakas towards the interior of India.

Bactrians : Also known as Indo-Greeks, they ruled in the extreme part of North-Western India. Their most famous ruler was Menander in the 2nd century B.C. (Capital : Sialkot)

Nagarjuna : A renowned Buddhist scholar who was responsible for spreading Buddhism in Afghanistan and later in the Deccan. His writing have been compiled in the book 'The Questions of Milinda'.

Sakas : Foreigners who came to India during the 1st century B.C. and succeeded in establishing their kingdom in Western India for nearly 3 centuries. Their most famous ruler was Rudradaman in the 2nd century A.D. He issued the first ever long inscription in Sanskrit. The Sakas settled in India and later became part of the Rajput population.

Parthians : Also called Pahlavas. The foreigners who came to India from the North-West during the 1st century B.C. and competed with the Greeks and the Sakas to establish their rule. Their most famous king was Gondophernes. During the reign, Saint Thomas, the apostle of Christ came to India.

Kushans : Also known as Yuechis or Tocharians, these Chinese nomadic hordes succeeded in establishing an extensive kingdom in the North-West India with Peshawar as the capital. There were two successive dynasties—the first, Kadphises ; and the second, Kanishka.

Kanishka : The best-known king of the Kushan Dynasty. Patronised Buddhism and was instrumental in establishing the Mahayana sect. As a great patron of arts and culture, he is credited with the promotion of the Gandhara school of art.

Mahayana : Meaning Great Wheel. Was the new form of Buddhism that developed during the period of Kanishka. It emphasized Buddha worship.

Hinayana : Meaning Small Wheel. Was practiced by those who stuck to the original teachings of Buddha.

Gandhara : The art from which flourished in and around Gandhar in North-West India during the first century A.D. The style is also known as Graeco-Roman.

Asvaghosha : A Buddhist scholar patronised by Kanishka. He wrote Buddhacharita.

Satavahanas : A most powerful dynasty in India which ruled the Deccan and Central India for nearly 3 centuries. Also known as Andhras. They had their capital Pratisthan (Paithan) in Maharashtra. One of its most powerful rulers, Gautamiputra Satakarni ruled during the 2nd century A.D.

Ikshvakus : The dynasty that succeeded the Satavahanas in the 3rd century A.D. Ruled in the Krishna-Guntur region and constructed many Buddhist monuments at Nagarjunakonda.

Pandiyas : The rulers of the kingdom in the extreme South India (South Tamil Nadu). Numerous dynasties ruled with Madurai as capital.

Cholas : One of the Three Kingdoms in Ancient Tamil Nadu, the others being Pandiyas and Cheras. Cholas were powerful during the first century of the Christian era. Their most powerful ruler Karikala. (Capital Uraiyur). Karikala

established Puhar (Kavaripattinam) and built an irrigation net-work which is still working.

Cheras : The rulers of the Western region of ancient Tamil Nadu coinciding with modern Kerala. The most famous king was Senguttuvan of the first century A.D.

Sangam Age and Literature : Period assigned 3rd to 1st century B.C. The Sangams were assemblies of learned men and poets held at Madurai, the Pandiya Capital. Three Sangams one after another. Two important collections are Pattu Pattu and Ettu Thogai. After the Sangam period, there were didactical literary works, of which the most important was Thirukural written by valluvar. The famous epic of this period was Silapathikaram written by Ilango.

Muranda Dynasty : The dynasty that ruled Central India for a short while after the decline of the Kushan power in the 3rd century A.D.

Gupta Dynasty : The dynasty started by started by Chandra Gupta I in 328 A.D. The Imperial Guptas established a vast empire covering North and Central India during the 4th and 5th centuries. Introduction of land grants on a large-scale paving the way for feudalism in India later. Decline of trade, particularly, foreign trade with Rome. Worsening of the caste system. Brahmanism flourished though Buddhism and Jainism were not suppressed. Issue of large quantities of gold coins. Literature, art and technology flourished and hence the 'Golden Age' of the Guptas, Finally destroyed because of repeated Hun invasions.

Samudra Gupta : Son and successor of Chandra Gupta I. Known as 'Indian Napoleon' for his wars of conquest. An accomplished musician. Was responsible for revival of Brahmanism in North India.

Chandra Gupta II : Legendarily known as Vikramaditya for his heroism and wise rule. Patronised art and literature by collecting, in his court, the best known talents of North India during his time. The Gupta empire reached the pinn of glory during his reign.

Kumar Gupta I : The son and successor of Chandra Gupta II. His rule was plagued by frequent attacks by the Pushyamitras and the Hunas.

Skanda Gupta : Succeeded his father Kumar Gupta I. Considered as the last of the Imperial Guptas.

Fa-Hien : One of the earliest Chinese pilgrims to come to India. Has left detailed and reliable account of the conditions in the Gupta empire and elsewhere in India.

Brahmanism : A form of Hinduism with extreme importance to Brahmans. It flourished during the period of the Gupta and later declined because of the impact of the Bhakti Movement.

Kalidasa : The world-famous Sanskrit poet of 5th century A.D. His dramas are *Abhijnana Sakuntalam*, *Vikramorvasiyam* and *Malavikagnimitra*. His epics are *Raghu Vamsa* and *Kumara Sambhavom*. His lyrics include *Meghdootum* and *Ritu Samhara*.

Amarasimha : A scholar in the Court of Chandra Gupta II who compiled the Sanskrit lexicon *Amarakosa*.

Panini : A Sanskrit grammarian of the Gupta period.

Patanjali : A Sanskrit grammarian of the Gupta period.

Aryabhatta : The famous mathematician and astronomer of 5th century A.D. His famous work '*Aryabhatiya*' lists important theorems and findings in Mathematics and Astronomy.

Varahamihira : A renowned astronomer patronised by the Guptas in the 6th century. His famous astronomy book is '*Brihatsamhita*'.

Susruta : A famous medicalman of the Gupta period who developed the Ayurveda system of medicine in Susruta. Founder of Dhanwantari school of Ayurvedic medicine.

Charaka : A medical practitioner of 2nd century A.D. who wrote '*Charakasmhita*', an encyclopedia of the Indian medicine. Founder of Atreya school of Ayurvedic medicine.

Kapila (6th century B.C.) : The author of the Sankhya system of philosophy (one of the six systems of Indian philosophy) which emphasizes materialism.

Charvaka : An Indian philosopher of the 6th century B.C. who developed the materialist school known as 'lokyata'.

Harishena : The Court poet of Smudra Gupta I.

Yashodharman : The ruler of Malwa who reigned supreme in West India during 6th century A.D. and successfully repulsed the attacks of Hunas.

Hunas : Hordes of foreigners from Central Asia who invaded India from the North-West repeatedly during 5th and 6th centuries A.D. Later they got integrated into the population of Rajasthan.

Itsing : A Chinese pilgrim who visited India in the 7th century A.D. and studied at Nalanda for many years.

Pallavas of Kanchi : Flourished during the 7th and 8th centuries A.D. The most famous rulers are Mahendra Varman and his son, Narasimha Varman.

Mahendra Varman I : The first of the Great Pallavas who ruled from Kanchipuram in the 7th century A.D. After his conversion to saivism from Jainism, he is reported to have indulged in religious persecution of the Jains,

Narsimhavarman : Son and successor of Mahendra Varman who established a vast Pallava Empire during his reign. Conquered parts of Ceylon. Built the famous architectural monuments at Mamallapuram.

Chalukyas of Badami : Ruled during the 7th and the 8th century with Badami (Vatapi) as capital. Established one of the most powerful kingdoms in the Deccan. Dominated the Deccan during the 8th century. Its renowned ruler was Pulekesin II who defeated Harsha on the banks of river Narmada and checked his advance towards the Deccan.

Pulekesan II : The most renowned ruler of the Chalukya dynasty who defeated Harsha Vardhana in the North and Mahendra Varman in the South. The Chalukyan empire in the Deccan reached the heights of its splendour during his rule. Finally defeated and killed by Narasimhavarman.

Ravi Kirti : The Court poet of Pulekesin II.

Vakatakas : A dynasty that ruled in Northern Maharashtra. Successors of Satavanas.

Gangas of Mysore : The dynasty that ruled in Southern Karnataka around 4th century A.D. with Kolar as the capital.

Kalabhras : The native ruler of Northern Tamil Nadu who fought against and destroyed the Pallavas and the kingdoms of the Deccan. They had conflicts with the Chola and Pandiya kings also. They patronised Buddhism and put down Brahmanism.

Harsha Vardhana : The best known king of the Pushyabhuti dynasty who ruled North from Kanauj. A great warrior, however he could not extend his empire beyond the Deccan because of his defeat at the hands of Pulekesin II. A liberal patterns of arts and himself an accomplished scholar. He is considered the last great Hindu Empire of North India. Promoted Buddhism and patronised the Nalanda University.

Hien Tsang : A Chinese Buddhist pilgrim who visited India during the 7th century A.D. Has given a graphic account of the condition of India and of the courts of Harsha Vardhana, Pulekesan II and Narasimhavarman.

Pala Dynasty : Established around Bengal (Gauda) and was at the height of its power during the 8th and the 9th centuries A.D. The greatest ruler of the Dynasty was Dharma Pala. Patrons of Buddhism.

Pratihara Dynasty : Ruled around Kanauj and sometimes extended to Western India. The best ruler of the dynasty Bhoja. Reached the peak of its glory during the 9th century and ended in the 10 century.

Rashtrakuta Dynasty : Set up by Dantidurga in the 8th century. Ruled in Maharashtra and fought for Gujarat and Malwa. The most important kings were Indira III and Krishna III. Their empire was destroyed at the end of the 10th century. (Capital : Malkhed in Maharashtra)

The Age of Three Empires : The tussle for supremacy in North India took place from the 8th to the 10 century. The participants were the Palas, Pratiharas and Rashtrakutas.

Rajashekara : A famous Sanskrit poet and dramatist of the 10th century. Patronised by the Pratihara king.

Al-Masudi : An Arab traveller of the 10th century who has left records of the conditions in India at his time.

Paramara Dynasty : Ruled Malwa during the 10th century.

Amoghavarsha : The Rastrakuta king of the 9th century who is credited with writing the earliest book of poems in Kannada.

Chandellas : The Dynasty which ruled Bundelkhand and came to prominence during the 10th and 11th centuries.

Kadambas : The dynasty that ruled Karnataka region during the 7th to the 9th century.

Ganga Dynasty of the West : The Western Gangas ruled the Western Karnataka, generally as feudatories of the Rashtrakutas, during the 8th and 9th centuries.

Great Cholas : The dynasty established by Vijayalaya in the 9th century. Produced a set of remarkable rulers during the 11th century. Known for its navy which established the supremacy of the Cholas in the Bay of Bengal and for the local self-government. The Chola empire disintegrated in the Twelfth century.

Rajaraja Chola : The founder of the dynasty of the Great Cholas in the 10th century A.D. Known for the temple built by him at Tanjore.

Rajendra Chola I : The son and successor of Rajaraja. During his reign, the Chola empire reached its maximum extent. Naval expeditions extended the domains of the Cholas to South-East Asian countries.

Yadavas : The dynasty that ruled at Devagiri (Dauladabad) in Maharashtra during the Medieval period.

Kakatiyas : The dynasty that ruled at Warangal during the Medieval period.

Marco Polo : The Venetian traveller, who visited Kerala on his way to China in the 13th century and has left an account of the conditions in India.

Kamban : The Tamil poet of the 11 century who wrote the Ramayana in Tamil. His contemporary and rival court poets were Ottakkuthan and Pugalendi.

Pampa, Ponna and Rana : The three gems of the Kannada poetry belonging to the 12th century.

Nanniyah : The Court poet of Chalukyas who wrote the incomplete Telgu epic of Mahabhartar. His work was completed by another well-known Telugu poet, Tikkanna.

Kalhana : A Kashmiri poet of the 12th century who wrote Rajatarangini.

Al-Biruni : A Persian historian whose writings in India are of great importance for reconstructing Indian history of his period. Patronised by Mahmud of Ghazni. His book on India 'Tahqiq al Hind'.

Nath Panthi Movement : A movement popularised by the Hindu Yogis under the leadership of Gorakhnath in North India. Denounced the caste system and preached the path of Tantra.

Bhakti Movement : A socio-religious reform movement that swept India during the Medieval Period. Started in South India around 11th century A.D. and later spread to North India. In the south, it may be considered as a reaction against the widespread conversion to Buddhism and Jainism and in the North, may be considered a reaction against the spread of Islam during the Sultanate period. Many reforms in the Hindu religious beliefs and practices, accommodating some of the good principles of Buddhism, Jainism, and Islam, such as relaxation of caste restrictions, the idea of one God, less emphasis on rituals etc. The proponents of the Movement in the South were Ramanuja, Madhva, Alvars and Nayanmars. In the North, the main exponents were Ramanand, Kabir, Namdev, Ramdas, Tukaram, Chaitanya and Guru Nanak.

Nayanars : The saints of Saivism in Tamil Nadu. Exponents of the Bhakti Movement.

Alvars : The exponents of Vaishnavism in Tamil Nadu.

Lingayat Movements : Started by Basava in Karnataka. Worshippers of Siva. Opposed the cast system and rituals.

Sankara : Born at Kaladi in Kerala in 780 A.D. Propagated Advaita (Advaitavada) and the Gnana Marga. Advaita advocates non-dualism i.e. the oneness of God and the created world.

Ramanuja : Born in Tamil Nadu in the 11th century. Advocated Vishistadvaita. Propagated Bhakti.

Madhava : An exponent of Bhakti Movement in Karnataka during the 10th century. Advocated 'Dvaita' i.e. the differentiation of creatures from the creator God.

Caliphate ; The kingdom or empire of the Caliph who was the supreme ruler of the Muslim world. The other Muslim rulers in various parts of the world are expected to derive their authority from the Caliph. Hence these other rulers used titles such as Sultan, Amir, Nawab etc.

Ghaznavids : The dynasties which ruled Ghazni in Central Asia.

Mahmud of Ghazni : A conqueror of Central Asia who conducted a number of raids in India. His conquest of the Punjab and Multan opened India to conquest from the North-West.

Firdausi : The Court poet of Mohamud of Ghazni. Known for his book Shah Namah.

Hindushahi Dynasty : Ruled Peshawar and the Punjab in the 10th century A.D. Extinguished as a results of the raids of Mohamud of Ghazni.

Gahadavala Dynasty : Ruled in Central India with Kanauj as capital in the 11th and the 12th century.

Chauhan Dynasty : Rulers of Ajmer in the 12th century.

Kalachuri Dynasty : Ruled Central Indian kingdom around Jabalpur.

Tomara Dynasty : Ruled Delhi in the 12th century till the Delhi Sultanat was established there by Mohamud of Ghazni.

Sena Dynasty : The dynasty which succeeded the Palas in Bengal around the 12th century.

Apabhramsha : The language of North India which eventually developed into the modern North Indian languages such as Hindi, Bengali and Marathi. It was the popular language along with Prakrit during the first millenium A.D.

Sufism : The movement of the Sufi saints who preached the message of love along with the tenets of Islam. Although it originated in Central Asia. It became a powerful movement in India during the 12th to the 14th century when the Bhakti movement also flourished. The Sufis were organised in 12 orders (silsilahs) some of them accepting the Islamic Law (shara) as final and some others not excepting so.

Muizzuddin Muhammad : Also known as Shahabuddin Muhammad or Muhammad-bin-Sam. Though he was the ruler at Ghazni, since his elder brother was rulling Ghur, he was also known as Muhammad of Ghur (Muhammad Ghuri). Was instrumental in establishing the Delhi Sultanate at the end of the 12th century.

Prithviraj Chauhan : The powerful ruler of Ajmer who tried to extend his kingdom through conquest but could not prove equal to Mohammad of Ghur. After his death, Ajmer was annexed to the Delhi Sultanat ; so his son went to Ranthambhor to found a new Chauhan kingdom there.

Jaichandra : The Gahadavala ruler of Kanauj who was defeated by Mohammad of Ghur in the battle of Chandwar in 1194. Although a powerful ruler of his time in India, he did not help Prithviraj in the Battles of Tarain.

Qutbuddin Aibak : A slave of Muizzuddin, he was placed in charge of the Indian territories and after the death of Muizzudddin, founded a kingdom around Delhi. Founder of the Delhi Sultanat. Qutb Minar is not associated with him.

Bakhtiyar Khalji A Turkish Commander in the army of Muizzuddin Mohammad who later conquered Bengal from the Sena kings and established the Muslim rule there.

Delhi Sultanat : The kingdom around Delhi which was ruled by different dynasties of Turkish and Afghan origin. It was superseded by the Mughal empire in the 16th century.

Iltutmish : Ruled Delhi in 1210-36. Is regarded as the real consolidator of the Turkish Sultanat in Delhi.

Raziya Sultana : The daughter of Iltutmish who ascended the throne of Delhi according to his will. After 3 years of rule (1236-39) she was killed.

Balban : A Turkish noble who deposed and succeeded Naziruddin Mohammed, a son of Iltutmish who occupied the throne during 1239-1265. Balban was responsible for establishing a strong centralised Government at Delhi. Known for his policy of 'blood and iron'.

Alauddin Khalji : An important Delhi Sultan who ascended the throne after murdering the Jalauddin, his uncle and founder of Khalji dynasty. Known for his conquests in Rajputana and the Deccan. His ruthless enforcement of price stability in Delhi market. Subdued the nobles thoroughly.

Malik Kafur : Captured as a slave by Alauddin Khalji; he rose to become the most powerful General under him.

Khusrau : A Hindu convert to Islam who occupied the throne at Delhi soon after the death of Alauddin Khalji. He was defeated and killed by Ghiyasuddin Tughlaq.

Mohammad bin Tughlaq : An important ruler of the Delhi Sultanat whose reforms were well ahead of his times and hence were not successful. Transfer of capital from Delhi to Deogir, introduction of the 'Token Currency System' and improvement of agriculture in the Doab. His empire covered almost the whole of India.

Ibn Battuta : A traveller from Morocco who visited India in the 14th century during the reign of Mohammad Tughlaq. His accounts of India are valuable for Indian History.

Mameluk Sultans : Also known as the slave dynasty. The Mameluks were descended originally from the Turkish slaves.

Firuz Tughlaq : The last important Tughlaq ruler of Delhi Succeeded Mohammad Tughlaq.

Timur : A Mongol ruler who embarked on a career of the conquest in the 14th century. He invaded Delhi in 1398, causing much destruction.

Jaziyah : According to the Islamic Law, the non-Muslim who accepted the Muslim rule, were given the status of 'protected' people on the condition that they paid tax called *jaziyah* which was a nominal amount and hence did not cause financial burden but was used to humiliate the Hindus. The tax was collected by the Ulema and retained by them for their maintenance.

Harihara : A feudatory of the Kakatiya rulers of Warangal, he established a kingdom at Vijaynagar in the 14th century A.D.

Hoysala Dynasty : Ruled Mysore, at first at the feudatories of the Chalukyas of Kalyani and later as independent kings, during the 13th and 14 centuries.

Bahmini Kingdom : Founded by Alauddin Hasan who assumed the title Bahman Shah claiming descent from a famous ancient ruler of Persia. The kingdom was responsible for the spread of Islam and the Persian culture in the Deccan. (Capital : Gulbarga and Bidar)

Ferishta : A Muslim historian of the 14 century.

Nuniz : A Portuguese traveller of the 16th century who visited the Vijaynagar empire.

Nicolo Conti : An Italian traveller who visited Vijaynagar in the 15th century and has left us a detailed account of the conditions there.

Abdul Razzaq : A Persian traveller who visited India during the 15th century and has given a vivid account of the Vijayanagar empire.

Firuz Shah Bahman : The most renowned ruler of the Bahmini kingdom (1397-1422). He made Gulbarga the cultural centre of India. He was finally compelled to abdicate in favour of his brother Ahmed Shah.

Imad Sahi Dynasty : Ruled Berar till it was annexed to the Mughal empire in 1596 A.D.

Mohammad Gawan : An important Minister (Peshwa) who was instrumental in maintaining the independence of the Bahmini kingdoms in the wake of onslaughts of the Delhi Sultanat. He was finally executed by the young Sultan because of the party strife in the Court.

Nizam Shahi Dynasty : Ruled Ahmadnagar till it was annexed to the Mughal empire in 1633 A.D.

Barid Shahi Dynasty : Ruled Bidar till it was finally annexed by Bijapur Sultanat.

Adil Shahi Dynaity : Ruled Bijapur and was engaged in tussle for supremacy with the Vijayanagar for nearly a century. Finally ended with the annexation of Bijapur by the Mughals in 1686,

Qutb Shahi Dynasty : Ruled Golconda (near Hyderabad) and took part in the balance of power struggle in the Deccan in the 15th and the 16th centuries and was finally extinguished by the Mughals in 1687.

Sangama Dynasty : Was founded by Harihara, ruler of Vijayanagar.

Saluva Dynasty : Ruled Vijayanagar empire after the Sangama Dynasty,

Tuluva Dynasty : A dynasty which ruled Vijayanagar empire. Its most famous king was Krishna Deva Raya.

Karnata Dynasty : The last dynasty that ruled at Vijayanagar.

Mameluk (Slave) Dynasty (1206-1290) : Qutbuddin, Aram, Iltutmish, Firuz Shah, Raziya, Muizzuddin, Masud Nasiruddin Balban, Kaiqubad.

Khalji Dynasty (1290-1320) : Jalaluddin, Ibrahim, Alauddin, Shihabuddin. Mubarak, Nasiruddin, Khusrau.

Tughlaq Dynasty (1320-1413) : Ghiyasuddin, Mohammad, Firuz Shah, Ghiyasuddin II, Abu Bakr, Nasiruddin, Nusrat Shah, Sikandar, Mahmud Shah.

Sayyid Dynasty (1414-1451) : Khizr Khan, Muizzuddin, Mohammad Shah, Alam Shah.

Lodi Dynasty (1451-1526) : Bahlul, Sikandar, Ibrahim.

Sultan Shamsuddin Ilyas Khan : The Turkish founder of the independent Sultanat in Bengal in the 14th century A.D.

Hafiz of Sheraz : A famous Persian poet of the 15th century with whom Azam Shah of Bengal had close contacts.

Ahoms : A Mongoloid tribe that settled in the present Assam about the 15th century and established a powerful Hindu.

kingdom there. The most renowned ruler is Suhungmung who accomplished rapid Hinduisation of the Ahoms.

The Ganga of Orissa : The dynasty that ruled in Orissa during the Medieval period. It was eventually superseded by the Gajapathi dynasty which contended with the Vijayanagar and the Bahmani kingdom for supremacy in Eastern India.

Ahmed Shah I : The founder of the Sultanat of Gujarat in the 15th century. He also founded Ahmedabad. The most famous ruler of his dynasty was Mahmud Begarha.

Rana Kumbha : A powerful ruler of Mewar in the 15th century A.D. His grandson, Rana Sanga was an equally famous ruler who defeated the ruler of Gujarat and the Delhi Sultan Ibrahim Lodi but was finally defeated by Babur.

Sharqi : The Sharqi Sultans ruled with Jaunpur (Uttar Pradesh) as capital, during the period of the Delhi Sultanat

Sikander Lodi : A famous Delhi Sultan of the Lodi dynasty who founded the city of Agra.

Arabesque : The style of architecture using decorative devices of Turkish and Arabic origin, e.g. geometrical and floral designs and artistic script. This was popularised by the Delhi Sultans and Mughal Emperors.

Qutbuddin Bakhtiyar : A famous sufi saint of the 13th century in whose commemoration Iltutmish built Qutb Minar.

Khwaja Muinuddin Chishti : A famous sufi saint of the Chishti order who came to India at the end of the 12th century and became very popular at Ajmer.

Nizamuddin Auliya : A Sufi saint of Delhi who led a simple life and had contact with the lower classes. His relations with Mohammed Tughlaq were strained.

Nasiruddin Chiragh-i-Delhi : A famous Sufi saint of the 14th century at Delhi.

Namdev : A Maharastrian saint of the 14th century who popularised the Bhakti Movement and discarded the caste distinctions.

Ramananda : A proponent of the Bhakti cult in Benaras who discarded the caste distinctions and included Kabir among his disciples.

Kabir : A Muslim exponent of Bhakti cult at Benaras who.

worked for Hindu-Muslim unity throughout his life. After him, his followers formed a sect known as Kabir Panthis.

Guru Nanak : The founder of Sikh religion who was born at Talwandi (Nankana) in 1469. Propagated devotion and love without distinction of caste or creed.

Chaitanya : A famous exponent of the Bhakti cult in Bengal. Popularised Krishna worship.

Surdas : A famous poet and saint of Western Uttar Pradesh, during the period of the Bhakti Movement.

Meera : A woman saint of Rajasthan who popularised Bhakti Movement.

Vallabha : A Sanskrit scholar of the 15th century who popularised Vedantic philosophy in the Gangetic Plain.

Vijnaneshwar : The 12th century author of Mitakshara, an important Hindu school of Law.

Amir Khusrau : A famous Persian poet who adorned the court of Alauddin Khalji. He was also an accomplished musician, and a close associate of the Sufi saint, Nizamuddin Auliya.

Babur : The founder of the Mughal Empire in India. His ancestors included the famous Central Asian warriors Chengiz Khan and Timur. Used gunpower for the first time in India in his attack of Bhira fort. His success in the Battle of Panipat in 1526, Well-versed in Persian, Arabic and his mother tongue Turkish. His memoirs 'Tuzuk-i-Baburi' is a world classic.

Rana Sanga : The most powerful Rajput ruler at the time of Babur's invasion. Defeated by Babur in the Battle of Khanwa (1527). This heroic Rana of Mewar wanted to renew conflict with Babur, but was poisoned by his nobles.

Jihad : Means a holy war. The Muslim invaders and rulers used to declare Jihad against the non-Muslim rulers.

Jauhar : The Rajput ceremony in which woman committed collective suicide to avoid falling into the hands of the enemy victors soon after a war. Collective Sati.

Humayun : Son of Babur who succeeded him. Had to contend with two powerful rivals—The Afghans in the East and Bahadur Shah of Gujarat. His brothers Kamran, Askari

and Hindal. Kamran and Hindal had love-and-hate relationship with Humayun and did not help him in his wars.

Bahadur Shah : An ambitious ruler of Gujarat, who offered stiff resistance to the Mughul domination during his life time.

Maldeo : The ruler of Marwar who expaended his kingdom by conquering other Rajput principalities. In the Battle of Samel he was decisively defeated by Sher Shah.

Sher Shah : An ambitious Afghan who rose from the rank of a petty official to establish an empire. Within a short span of five years (1540-45) he was able to re-organise the Delhi Administration impressively. Died accidentally during his campaign against Kalinjar Fort.

Sur Administration : The Sur Dynasty may be regarded as a continuation of the Delhi Sultanate. The Chief merits of the Sur Administration are establishment of law and order through a new Penal Code prescribing severe punishment to criminals, the promotion of travel and trade by building good roads and establishing sarais (fortified inns) and by organisation of an efficient news service and spy system. Currency reforms. Sher Shah took interest in the welfare of the peasants. His successor Islam Shah codified the laws and was known for his sense of justice.

Akbar : The greatest of the Mughal rulers. The real consolidator of the Mughal Empire. Known for his reforms in land revenue administration and for religious tolerance. Cultivated the friendship of the Rajputs and abolished Jazia and the pilgrim tax. Promulgated Tauhid-i-Illahi, but did not compel his courtiers and the people to follow it. He conquered many areas of India and extended his Empire to the scientific frontier in the North-West and thus averted the threat of Uzbeks from Central Asia for two centuries.

Bairam Khan : The tutor and uncle of Akbar. During the regency of Akbar, he fought and won the Second Battle of Panipat. Remained at the helm of affairs for another four years. On his way to Mecca, assassinated by an Afghan.

Mirza Hakim : Akbar's half-brother who captured Kabul and created problem for Akbar in the initial period of his reign.

Zabti System : A system of land revenue introduced by Akbar in the major part of his empire. Involved scientific measurements and assessment of the areas cultivated by the peasants.

Bata : The oldest and most common system of assessment, involving sharing of crops between the peasants and the State, in fixed proportions.

Mansabdari System : The system, akin to the Feudal system prevailing in Medieval Europe. It was introduced by Akbar in the Mughal Empire in order to organize the nobility and the army. Under the system each officer was assigned a rank (mansab). Varying from 10 to 7000, the mansab carried the *Zat* (the personal status and salary) and *Sawar* (the number of cavalymen required to be maintained). Depending on the relation between the *Zat* and the *Sawar*, there were three categories in every mansab. This system continued during the period of the Great Mughals and later.

Jagir System : The system of settlement of the nobility on land. A Jagirdar appointed or recognised by the sovereign was assigned, through a land grant in perpetuity, a tract of land in which he could collect the land revenue. The Jagir system was hereditary. The system had its origin in the period before the establishment of Delhi Sultanat and continued right upto the end of the Mughal period. In the Mansabdari system, generally a Jagir was allotted to the mansabdar in lieu of cash payment.

Raja Todarmal : The brilliant revenue officer of Akbar. He had earlier served under Sher Shah. He is associated with the introduction of the Zabti and Tahsala systems of land revenue.

Bhara Mal : The ruler Ambar with whom Akbar established matrimonial alliance. His son Bhagawan Das and his grandson Man Singh rose to high ranks in the court of Akbar.

Rana Pratap : The son of Udai Singh of Mehar who refused to submit to the Mughal empire. Even after being defeated by Akbar's army in 1576, he resorted to the hills and continued to wage guerilla warfare. By the time of his death

Urdu : A combination of persian and Hindi. Was first synthesized in the Deccan during the period of the Deccan Sultanates and later spread to North India.

Madanna and Akkanna : Two Hindu brothers who dominated the Court of Qutb Shah of Golconda till the state was annexed by the Mughals.

Jahangir : The eldest son of Akbar. Revolted against his father but was subdued. Ascended the throne without difficulty. His eldest son, Khusrau revolted against him and was imprisoned later. Married Nur Jahan. Continued the policy of Akbar with regard to Rajputs. Mughal paintings reached the peak during his period.

Shah Jahan : Killed his brother Khusrau in prison and later revolted against his father. Built Taj Mahal at Agra and Red Fort and Jama Masjid at Delhi. Imprisoned by his son, Aurangzeb, he died in prison. Mughal architecture reached the peak during his period.

Aurangzeb : Son of Shah Jahan. Came to power by eliminating all his brothers. Reversed the religious policy of Akbar and imposed Jazia. Led an extremely simple personal life. Ruled for nearly five decades. His Deccan policy failed towards the end of his life. The number of nobles in the Mughal Court increased enormously. Was partially responsible for the disintegration of the Mughal Empire after him. Instrumental music reached the peak during his period.

Shivaji : A famous Maratha warrior who built up an empire by dint of hard work and courage. Followed guerilla warfare in most of his military engagements. Withstood the onslaught of the Deccan Sultanates and the Mughal Empire by cleverly intriguing with one against the other. Considered the last Hindu Emperor in India.

Mughal Dynasty : Zahiruddin Babur, Humayun, Akbar, Jahangir (Salim), Shah Jahan (Khurram), Aurangzeb (Alamgir), Bahadur Shah I (Shah Alam I), Jahandar Shah, Farrukhsiyar, Rafi-ud-daulah, Mohammed Shah, Ahmed Shah, Alamgir II, Shah Alam II, Akbar Shah II, Bahadur Shah II.

Chauth : The land tax collected by the Maratha Chiefs. Normally one-fourth of the average produce on the land.

Sardeshmukhi : The compulsory collection made by the Marathas, mostly in the areas plundered by them.

Guru Gobind Singh : The tenth and last Sikh Guru. Antagonised Aurangzeb but later was friendly with Bahadur Shah I.

Banda Bahadur : The Sikh leader succeeded Guru Gobind Singh. Fought against the Mughal Empire.

Chatrasal : The Bundela Chief who maintained friendly relations with the Mughal Emperors in the 18th Century.

Churaman : The Jat Chief who campaigned against the Sikhs on behalf of the Mughal Empire.

Wazir : The most important post in the Mughal Court and the top-most among the nobles in the Mughal Empire.

Saiyad Brothers : Abdullah Khan and Hussain Ali Khan who became the king-makers in the Mughal Court for a short period in the 18th Century.

Pilgrim Tax : The tax imposed by the Muslim rulers on the pilgrims who visited the Hindu pilgrim centres.

Nizam-ul-Mulk : A powerful Mughal noble who rose to the position of Wazir in the Mughal Court but later founded the State of Hyderabad in the Deccan (1724).

Nadir Shah : The Afghan king who invaded India in 1739 and took away Kohinoor diamond and the Peacock Throne of Shah Jahan after plundering Delhi.

Ahmed Shah Abdali : The successor of Nadir Shah in Afghanistan. He repeatedly raided India for booty. In 1761 defeated the Marathas in the Third Battle of Panipat.

Sham Alam II : The Mughal Emperor who remained a fugitive till he was kept at Allahabad as the prisoner of the Britishers during 1764-1771. Later he was kept at Delhi as the pensioner of the Marathas till his death.

Hyderabad State : Founded by Nizam-ul-Mulk in 1724. Continued to exist as a large princely State throughout the British Rule in India. Finally integrated to Free India in 1948.

Nawabate of Carnatic : Started in the 18th Century as a feudatory of the Hyderabad State. Later the Nawabs of Carnatic assumed independence and took part in the Anglo-French rivalry. Finally extinguished and integrated to the British Empire in India at the end of the 18th Century.

Nawabate of Bengal : Starting as a province of the Mughal Empire, it was turned into an independent Nawabate by Murshid Quli Khan, in the 18th Century. In 1772 it was annexed to the British Empire in India.

Kingdom of Avadh : The Mughal Province of Avadh was turned into an autonomous kingdom by Saadat Khan in the 18th Century. After the British conquest it continued to be a subsidiary princely state, till it was annexed to the British Empire in 1856 by Lord Dalhousie on the ground of mismanagement.

Kingdom of Mysore : Started as an independent kingdom after the disintegration of the Vijayanagar Empire. In the later part of the 18th Century Haidar Ali rose to prominence and seized power the Hindu king. After the death of Tippu Sultan, the truncated Mysore State was handed over to the descendent of the earlier Hindu rulers. In 1839, Lord Bentinck annexed it to the British Empire on the ground of mismanagement. But in 1884 the kingdom was restored to the descendants of the former rulers. Finally the princely State was integrated to the Free India.

Haidar Ali : A powerful ruler of Mysore State who fought against the English East India Company throughout his reign.

Tippu Sultan : The son of Haidar Ali who opposed the British rule in India with all his might and resources. He died fighting.

Zamorin of Calicut : This principality was in existence for more than five centuries till its territories were annexed to the Mysore State by Haidar Ali.

Jai Singh of Amber : A remarkable Rajput ruler of the 18th Century. He was a distinguished statesman, reformer and astronomer. Built the astronomical Observatory, known as Jantar Mantar in Delhi.

The Jat State of Bharatpur : This State covering the Jat homeland around Delhi and Agra was set up by Churaman and, inspite of the suppression by the Mughal Emperors, reached its peak during the period of Surajmal. After his death in 1763, it disintegrated and split into Zamindaris.

Ranjit Singh : A Sikh Chief who rose to great prominence at the beginning of the 19th Century.

Maratha Confederacy : After the decline of the Maratha Empire following the Third Battle of Panipat, five big principalities of Maratha Chiefs formed this confederacy with Peshwa as the nominal head. The five are the Peshwa at Poona, the Gaekwad at Baroda, the Sindhia at Gwalior, the Holkar at Indore and the Bhonsle at Nagpur.

Tayumanarar : The saintly poet and sittar of the 18th Century who popularised the Sidha cult in Tamil Nadu.

Kunchan Nambiar : A great poet of Kerala. He popularised poems in spoken Malayalam during the 18th Century.

Waris Shah : A famous romantic poet in Punjabi who composed the Epic 'Heer Ranjha' in the 18th Century.

Shah Abdul Latif : A famous Sindhi poet who composed the collection of poems, titled 'Risalo'.

The Portuguese Rule in India : The Portuguese traders who came to India at the beginning of the 16th Century remained without European rivals for about a century but could not establish their rule except in a few trading settlements on the West Coast of India. While they dabbled in the Court politics in some of the Indian Kingdoms, they could not decisively defeat any major ruler of India on land. Competition with the English East India Company at the beginning of the 17th Century resulted in the decisive defeat of the Portuguese who remain confined to Goa, Diu and Daman after 1630.

The Dutch East India Company : Formed in 1602 with a charter from the Dutch Parliament, the Company had to wage naval battles with the Portuguese and the English for the supremacy in the Indian ocean. After intermittent wars

with the English Company between 1654 and 1667, the Dutch Company finally settled in the Spice Islands (Indonesia) leaving India to the English Company. In 1795 the Dutch were expelled from their last possessions in India by the English. Their trading depots were established at Surat, Broach, Cambay, Ahmedabad, Cochin, Nagapatinam, Masulipatinam, Chinsura, Patna and Agra.

Farman : Also called firman. A decree issued by a Mughal Emperor. It was binding on all the Provincial Governors and the subordinate kingdoms.

Dupleix : The most resourceful French Governor-General in India. He waged relentless battles against the English Company and was known for his intrigues with the local kings. However he could not succeed in his ambition. Recalled by the French Government, he died a sad man.

Robert Clive : Starting as a Clerk in the English Company's service, he rose to the level of the Governor of Bengal. Known for his capacity for intrigue. Hailed and honoured by the Britishers as the founder of the British empire in India.

Dyarchy : (Dual Government) The system of Government that existed in Bengal from 1765 to 1772. After the battle of Buxar, the British set up Nizam-ud-daulah on the throne of Bengal and made him appoint the Company as the Deputy Subahdar with the power to control the Nizamat. From the defeated Shah Alam II, the Company got the 'diwani' i.e., the right to collect the revenue of Bengal. Then the Company appointed one and the same official as the Deputy Diwan on behalf of the Company and as Deputy Subahdar on behalf of the Nawab. Thus the British official got the police, judicial and revenue powers but without any responsibility. The responsibility for the administration still vested in the Nawab of Bengal, but he had no powers. This system of Government resulted in the complete ruin of Bengal's wealth and impoverishment of the people. Seeing its disastrous effects, the Company officials decided to take over the direct administration of Bengal in 1772.

a champion of social reform and education and promoted rationalism and secularism in Maharashtra.

Mangal Pande : The Indian soldier of the Barrackpur battalion whose revolt against and attack on his superiors was the starting point of the Revolt of 1857. He was hanged for his mutiny.

Kunwar Singh : Kunwar Singh of Jagdishpur, the chief organiser of the Revolt of 1857 in Bihar. Even in his old age he fought gallantly and died fighting.

Maulavi Ahmadullah of Faizabad : One of the foremost leaders of the Revolt of 1857 who preached rebellion for a major part of his life. He was treacherously killed after the suppression of the Revolt.

Lord Mayo : Remembered for his policy of separating the finances of the Central Government from those of the Provincial Governments.

Satyendranath Tagore : Brother of Rabindranath Tagore who became the first officer of the Indian Civil Service in 1863.

Lord Lytton : Remembered for his provocative policies which led to the organisation of the Indian Nationalism.

Charles Metcalfe : Remembered for his removal of all the restrictions on the Indian Vernacular Press.

Sir Siyad Ahmed Khan : (19th Century) : A Muslim leader who worked for the upliftment of his community, mainly modern education. Founder of Anglo-Oriental College at Aligarh.

Surendranath Bannerjee : (19th and 20th Centuries) : Father of Indian Nationalism. A prominent Moderate leader in the Congress. Later formed National Liberal Federation.

Subhas Chandra Bose (20th Century) : A prominent left-wing Bengali leader of the Congress. President of the Congress for sometime. Leaving the Congress, founded the Forward Bloc. Led the I.N.A.

Gopala Krishna Gokhale : (19th and 20th Centuries) : A prominent Maharashtrian politician and social worker. A

Moderate in the Congress. Founder of the 'Servants of India Society'.

Jinnah (19th and 20th Centuries) : A prominent leader in the Congress during his early political career. Later a prominent leader of the Muslim League. Father of Pakistan.

Dadabhai Naoroji (19th and 20th Centuries) : A Parsee leader of Bombay who took interest in Indian political, economic and social progress. A Moderate leader in the Congress. Known as 'the Grand Old Man of India', and 'the Father of Indian politics and economics.'

B.G. Tilak (19th and 20th Centuries) : Known as Lokmanya and 'the father of Indian unrest'. His journals, 'Kesari' (Marathi) and 'Mahratta' (English). A prominent extremist leader in the Congress. Started Home Rule Movement in 1917.

Rabindranath Tagore (19th and 20th Centuries) : Known as Gurudev. Won the Nobel Prize for literature for his collection of poems 'Gitanjali'. His short stories and novels in Bengali. His contribution to music and painting quite substantial.

Jawaharlal Nehru : An active freedom-fighter and Congress leader. Was the President of the Congress many times. As the First Prime Minister of India, initiated planning and formulated India's foreign policy.

Mahatma Gandhi : Born at Porbandar on 2 October 1869, Mohandas Karamchand Gandhi became 'the Father of Indian Nation'. Known for his new theory and technique of non-violence and Satyagraha. Provided leadership to the Congress since 1920. Was shot dead by Nathuram Godse on 30 January 1948.

Belur : Karnataka. Chennakesava temple of Hoysala architecture.

✓ *Halebid* : Karnataka. Hoysaleswara temple of 12th century.

✓ *Somnathpur* : Karnataka. Kesava temple of the 13th century.

Nagarjunakonda : Andhra Pradesh. Ancient temples of Buddhists.

✓ *Suchindram* : Tamil Nadu. Temple of Dravidian architecture.

Trivandrum : Kerala. Padmanabha Temple.

Arikamedu : Near Pondicherry. Known for large-scale excavations of the Chola period.

Bodhi Gaya : Bihar. Buddha's enlightenment. Many Buddhist temples and monasteries.

Daulatabad : Near Aurangabad in Maharashtra. Capital of Yadavas. The tomb of Aurangzeb.

Fatehpur Sikri : Near Agra. Founded by Akbar to be the capital, but abandoned soon after. Buland Darwaza.

Junagarh : Gujarat. An ancient city having many Jain temples.

✓ *Kanheri* : Near Bombay. Buddhist caves of first century A.D.

Mandu : Madhya Pradesh. Synthesis of Hindu and Muslim styles of architecture and paintings. Many temples and mosques.

Nalanda : Bihar. The seat of an ancient Buddhist university which had thousands of students at a time.

Pandrapur : Maharashtra. Place of pilgrimage for Hindus.

Somnath : Gujarat. Now known as Prabhas Patan. The famous temple, was destroyed by Mohammed of Ghazni.

Rajgir : Bihar. Once capital of Magadh. Buddha and Mahavira preached there.

Srirangapatnam : Karnataka. The capital of Tipu Sultan.

✓ *Sringeri* : Karnataka. Known for the Mutt founded by Sankara.

Diwaraka : Gujrat. Legendary capital of Krishna. The Mutt founded by Sankara.

Badrinath : Place of pilgrimage for Hindus. Mutt founded by Sankara.

Tirupati : Andhra Pradesh. The temple of Balaji or Venkateswara. Dravidian style of architecture.

Hardwar : Place of pilgrimage for Hindus. Kumba Mela held here.

Mathura : Uttar Pradesh. Legendary birth place of Krishna.

Ujjain : Madhya Pradesh : Ancient capital of many dynasties. Place of pilgrimage for Hindus. Mahakaleswar temple.

Kanauj : Uttar Pradesh. A historical place, which was the capital of many dynasties.

Bundelkhand : Madhya Pradesh. During the Medieval period, the Chandellas were the famous rulers, there.

Malwa : Gujarat and Madhya Pradesh. A fertile tract which was a bone of contention between different rulers of Western India during the Medieval period.

Malkhed : Maharashtra. Also known as Manyakhet. The capital of Rashtrakutas.

Vangi : Andhra Pradesh. The capital of Eastern Chalukyas.

Kadaram : Also known as Kedah. A place in Malay Peninsula which was conquered by the Chola king Rajendra I through a naval expedition.

Kalyani : The capital of later Chalukyas.

Anuradhapur : The ancient capital of the rulers of Sri Lanka. It was conquered many times by the South Indian Kings.

Dravidian Style of Architecture : Found in South India particularly in Tamil Nadu. The main feature is the building of storey upon storey above the chief deity room.

Chalukyan Style of Architecture : Found in many places of Andhra Pradesh and Karnataka. The main feature is the depiction of the deity in a reclining position.

Borobudur : Jawa (Indonesia). Buddhist temple here is a fine specimen of the influence of Indian architecture in the South-East Asia.

Ankorvat : Combodia. The site of well-known Hindu temple showing the cultural influence of India on Combodia.

Tamralipti : The chief port of Bengal during the Medieval period. Trade with South East Asian countries was conducted through this port.

Waihind : Near Peshawar. The Medieval capital of the Hindushahi Dynasty which ruled Peshawar and Punjab.

Multan : Pakistan. An ancient city in the Punjab which had seen the invansion of many a warrior from the north-west of India.

Nagara Style of Architecture : This style flourished under the Chandellas and Rajputs in North India and the Deccan. The chief characteristic feature is the tall curved spiral roof over the chief deity room. The best specimen of this style are found in the Khajuraho temples and the temples of Orissa.

Nadia : West Bengal. The capital of the Sena dynasty of Bengal.

Cis-Sutlej : The area between Lahore and the river Sutlej.

Siri : The new capital near Delhi, built by Allauddin Khilji.

Ranthambhor ; A Rajput principality which emerged as the most important Rajput kingdom after the decline of Chauhans of Ajmer. Had the strongest fort in Rajasthan.

Chittor : An important Rajput principality. Known for its strong fort which was stormed once by Alaudin Khilji.

Dwarasamudra : Karnataka. The capital of Hoysalas during the Medieval period.

Mabar : The name given to North Tamil Nadu area during the Muslim period.

Broach : An important medieval port in Gujarat.

Cambay : An important medieval port in Gujarat.

Gulbarga : Karnataka. Once the capital of the Bahmini kingdom.

Golconda : Andhra Pradesh. One of the five Sultanates of the Deccan. Known for its diamond mine in the past.

Goa : An excellent natural harbour and port in Bijapur kingdom. It was later captured by the Portuguese.

Diu : A site in Gujarat coast. The Portuguese built a fortress there and later occupied it.

Bassein : A port town of Gujarat.

Pandua : The capital of Bengal Sultanate in the 14 century

Kamrup : Also known as Kamata. A separate kingdom in the Western part of modern Assam was there during the medieval period.

Mandu Style of Architecture : Built by the Muslim rulers of Málwa, Its chief characteristic feature was massiveness of the buildings and the large-scale use of colour and glazed tiles. The best known specimen of this style are Jami Masjid Hindola Mahal, and Jahaz Mahal.

Kumbhalgarh : The capital of Rana Kumbha of Mewar. It was lonely defended by the Rajput Rulers till it was annexed to the Mughal Empire.

Agra : The city built by Sikandar Lodi. It has many historical monuments.

Sesaram : Bihar. The famous tomb of Sher Shah.

Dakshineshwar : West Bengal. A place associated with Sri Ramakrishna Paramhansa and Swami Vivekananda.

Hyderabad : Andhra Pradesh. Kingdom of Hyderabad was founded in the 18th century. Known for Char Minar,

Bijapur : Karnataka. One of the five Sultanates of the Deccan. Known for Gol Gumbaz, the tomb of Mohammad Adil Shah, having the second largest dome in the world.

Palani : Tamil Nadu. An important pilgrim centre for Hindus. Temple of Lord Murugan (Subramania).

Sabarimalai : Kerala. A famous pilgrim centre for Hindus. Temple of Lord Iyyapan.

Jaipur : Rajasthan. Known for Ambar palace, Hawa Mahal and other specimen of Rajasthan architecture. Raja Jaisingh's observatory.

Raigarh : Maharashtra. Known for the fort where Shivaji was crowned.

Ajmer : Rajasthan. Tomb of Khwaja Muinuddin Chisti.

Allahabad : Uttar Pradesh. Also known as Pryag. Place of pilgrimage for Hindus. Kumba Mela held here.

Varanasi : Uttar Pradesh. Also known as Benaras of Kasi. A place of pilgrimage for Hindus. Many temples including Vishwanatha and Bharat Matha temples.

Kurushetra : Haryana. The legendary place of Mahabhartha War.

Panipat : Haryana. An ancient town. The site of three battles in 1526, 1556 and 1761 which decided decisively the course of Indian History.

Delhi : One of the most ancient cities in India. Known for Qutb Minar, Gupta period Iron pillar, Red Fort, Jama Masjid, Jantar Mantar etc.

4

World History—Chronology

B.C.

- 2650 : The first pyramid built in Egypt.
- 1800 : Hammurabi, a Babylonian Emperor, proclaims the first code of laws in the world.
- 1000 : End of ancient Egyptian civilization. Development of alphabet by phoenicians.
- 753 : Foundation of the city of Rome.
- 594 : Solon proclaims the reformed constitution of Athens.
- 560 : Lydians issue the first known coins of the world.
- 490 : The Battle of Marathon—the Persians defeated by the Greeks,
- 431 : The Peloponnesian War between Athens and Sparta.
- 336-323 : Reign of Alexander, the Great.
- 214 : The construction of the Great Wall of China by Shi-Hwang-Ti.
- 196 : The Roman conquer the Greek city-states.
- 122 : Establishment of Training College for Civil servants in China.
- 49-44 : Rule of Julius Caesar in Rome.
- 27 : Caesar Augustus (Octavian) becomes the Emperor of Rome.
- 4 : Birth of Jesus Christ.

A.D.

- 6 : Civil Service Examination conducted in China.
- 306 : Constantine becomes the Roman Emperor.
- 395 : Division of Roman Empire into Eastern and Western empires.

- 410 : The end of Western Roman Empire.
- 570 : Birth of prophet Mohammed, founder of Islam.
- 605 : Construction of the Grand Canal of China.
- 622 : Beginning of the Mohammedan era with Hejira. flight of Mohammed from Mecca to Medina.
- 800 : Charlemagne crowned as the Holy Roman Emperor.
- 868 : The first printed book appears in China.
- 1000 : Leif Ericson discovers North America.
- 1075 : Capture of Jerusalem by Turks.
- 1099 : The first Crusade of Christians against the Turks to recapture Jerusalem.
- 1161 : Explosives used in warfare for the first time in China.
- 1215 : Manga Carta in England.
- 1291 : The end of Crusades. Christians fail to recover Jerusalem.
- 1453 : End of the Byzantine (Eastern Roman) empire with the capture of Constantinople by the Turks.
- 1488 : Bartholomew Diaz sails round the Cape of Good Hope.
- 1517 : Martin Luther starts the Reformation in Europe.
- 1582 : The present Gregorian Calender introduced by Pope Gregory XIII.
- 1588 : The defeat of the Spanish Armada by the English. End of Spanish supremacy in the open seas.
- 1603 : England and Scotland unite to form Great Britain.
- 1649 : Cromwell becomes the protector of the Commonwealth in England. King Charles I executed.
- 1660 : Restoration of monarchy in England.

- 1688 : The Bloodless Revolution in England. James II abdicates the throne.
- 1721 : Robert Walpole becomes the first Prime Minister of England. The beginning of the cabinet System.
- 1773 : Boston Tea Party.
- 1776 : American Declaration of Independence.
- 1787 : The drafting of the American Constitution, the first written in the world.
- 1789 : The beginning of the French Revolution. Washington becomes the first President of U.S.A.
- 1795 : Napoleon Bonaparte assumes power in France the end of the French Revolution.
- 1805 : The first defeat of Napoleon in the Battle of Trafalgar.
- 1815 : Defeat of Napoleon in the Battle of Waterloo—his imprisonment in St. Helena.
- 1823 : The announcement of the Monroe Doctrine by the President of the USA.
- 1840 : The introduction of the first postal system in England.
- 1848 : The publication of the Communist Manifesto by Marx and Engels.
- 1854 : Crimean War.
- 1861 : The Civil War in USA with Abraham Lincoln as the President.
- 1869 : The opening of the Suez Canal.
- 1900 : Australia gains dominion status.
- 1905 : Russia defeated by Japan.
- 1912 : China becomes Republic under Sun Yat Sen.
- 1914 : The beginning of the First World War.
- 1917 : The successful Bolshevik Revolution in Russia.
- 1918 : The end of the ~~Second~~ World War—abdication of Emperor William II in Germany.
- 1919 : The Treaty of Versailles.
- 1920 : The League of Nations first meeting.
- 1921 : Ireland becomes an independent republic.

- 1929-1933 : The Great Depression.
- 1934 : Hitler becomes dictator of Germany.
- 1939 : The beginning of the Second World War.
- 1945 : The end of the Second World War. The defeat and death of Mussolini in Italy and Hitler in Germany. The United Nations Charter signed at San Francisco. Dropping of Atom Bomb on Hiroshima and Nagasaki in Japan by the USA.
- 1946 : The first session of the UN General Assembly at London followed by the Second Session at New York.

Names and Terms in World History

Alexander the Great (4th Century B.C.) : Son of Philip, the King of Macedon in Greece. Internationally known as one of the most powerful warriors of history. Established an unstable Empire extending from Greece to North-West India. Died at the young age of 33.

Aristotle (4th Century B.C.) : A renowned Greek philosopher and genius. Has written on many subjects like history, politics, biology, philosophy etc. His writings remained the supreme guide for the Western World till modern times.

Baden Powell (19th and 20th Centuries) : The English founder of the Boy Scouts and Girl Guides.

Beethoven : (18th and 19th Centuries) : A German musician and composer. His nine symphonies are internationally famous. In spite of his deafness in later years, he continued to compose songs and concerts.

Bismarck (19th Century) : A leading statesman and Chancellor of Germany, who was responsible for the unification and militarisation of the Germany. Known as 'the man of blood and iron' because of his strong-arm policies.

Cavour (19th Century) : An Italian noble and statesman who was instrumental in the unification of Germany. One of the most successful statesmen of Europe of his times.

Winston Churchill (19th and 20th Centuries) : A British Prime Minister of the 20th Century, known for his war-efforts during the Second World War. A Conservative who refused to think of granting freedom to India. Nobel Prize for Literature in 1953.

Charlemagne (8th Century) : A powerful ruler of Europe who founded the Holy Roman Empire which dominated European politics for nearly eight centuries.

Chingez Khan (12th Century) : A Mongol ruler, who became one of the mightiest warriors of the world. He invaded many parts of Europe and Asia.

Cleopatra (1st Century B.C.) : A famous Queen of Egypt, whose romance with Roman leaders Julius Caesar and Antony are well known.

Columbus (15th Century) : An Italian navigator who is acclaimed as the discoverer of America.

Confucius (6th and 5th Centuries B.C.) : Founder of Confucianism, the principal Chinese religion which was later partially replaced by Buddhism from India. He was more of a sage than religious leader and mainly advocated good conduct,

Oliver Cromwell (17th Century) : A military leader of England who fought for the cause of Parliament during the Civil War of the 17th Century. Established a Commonwealth in Britain, which collapsed soon after his death.

Charlie Chaplin (20th Century) : A top-class film comedian of U.S.A.

Walt Disney (20th Century) : A famous cartoonist of America who is remembered for his collection of fantasies known as 'Disneyland'.

Disraeli (19th Century) : A leading statesman of Britain and political writer. He was Prime Minister of England for some time.

Dwight D. Eisenhower (19th and 20th Centuries) : A Republican President of U.S.A. who was earlier the Supreme Commander of the Allied Forces during the Second World War.

Garibaldi (19th Century) : A famous Italian patriot who was mainly responsible for the unification of Italy. He made Italy an important power in Europe, before he retired from politics.

Hitler (20th Century) : The Nazi leader who rose to the pinnacle of power from lowly ranks in the army. He used the Nationalist Socialist Party (Nazi) to overthrow democracy and to become the Dictator of Germany. After the defeat of Axis powers in the Second World War he committed suicide.

Julius Caesar (1st Century B.C.) : A brave Roman General who was instrumental in establishing Rome as a major power. He was assassinated by his Republican friend, Brutus and others.

Kemal Atatürk (20th Century) : Hailed as the founder of Modern Turkey, he was responsible for the abolition of Caliphate and for building up modern Turkey through Dictatorship. His organisation was 'Young Turks'.

N. Khrushchev (20th Century) : The third supreme leader of Communist Russia. Came to power after Stalin and was ousted from power by Brezhnev in 1964.

Martin Luther King (20th Century) : An American Negro leader known for organising a movement for civil rights of the American Negroes, Awarded Nobel Peace Prize. Assassinated in 1968.

N. Lenin (19th and 20th Centuries) : Leader of Bolshevik Party which succeeded in overthrowing the Czar of Russia, during the October Revolution of 1917. As a theoretician of the Communist movement, he wrote a number of books.

Leonardo da Vinci (15th Century) : A famous Italian painter, known for his very popular paintings 'Mona Lisa' and 'Last Supper'. He was also an all-round genius and contributed to engineering, architecture and other sciences.

Abraham Lincoln (19th Century) : A famous President of U.S.A. who fought successfully the Civil War for the cause of abolition of slavery in his country. He was assassinated in 1865.

Louis XVI (18th Century) : The King of France who was executed in 1793 in the course of the French Revolution. His Queen Marie Antoinette was also guillotined for her extravagant life style.

Machiavelli (15th and 16th Centuries) : One of the best known European diplomats. Author of the famous political science treatise 'The Prince'.

Mao Tse-Tung (20th Century) : The supreme leader of Communist China, who was instrumental in establishing 'People's Republic of China' on the mainland. He organised the 'Long March' and guided the destinies of China from 1949 till his death in 1976.

Martin Luther (15th and 16th Centuries) : A German religious reformer who started the Reformation in Europe and founded the Protestant Church named after him.

Karl Marx (1818-83) : One of the most important philosophers of the world. This German thinker spent most of his time in England. Founder of Marxism. Author of 'Das Kapital' and 'Communist Manifesto'.

Mazzini (19th Century) : One of the Italian patriots, responsible for the independence, unification and the militarisation of Italy.

Yehudi Menuhin (20th Century) : A world-famous violinist of U.S.A. Got the Jawaharlal Nehru Award for International Understanding. A promotor of Indian classical music.

Michaelangelo (15th and 16th Centuries) : A renowned Italian painter and sculptor. His 'Last Judgement' is an immortal work.

Madame Montessori (19th and 20th Centuries) : An Italian educationalist who evolved the system of primary education which stands by her name.

B. Mussolini (19th and 20th Centuries) : Founder of Fascism and the Fascist Party of Italy. He established his dictatorship in the inter-War period and fought on the side of the Axis, during the Second World War. After the defeat of the Axis Powers, he was shot dead in 1945. A close ally of Hitler.

Napoleon Bonaparte (18th and 19th Centuries) : A great warrior of France who rose up the ladder from lowly ranks. He took advantage of the post-Revolutionary situation in France and established an Empire. Tried to conquer much of Europe, but was finally defeated in the Battle of Waterloo in

1815 by the British General, Duke of Wellington and was exiled to the island of St. Helena, where he died in 1821.

Gamel Nasser (20th Century) : An Egyptian military leader who established a modern Republic in Egypt. President of Egypt from 1954 till his death in 1970.

Claudius Nero : A Roman Emperor of first century A.D. Known for his monstrocities including the killing of his tutor, philosopher Seneca, for fun. Alleged to have fiddled when burning.

Florence Nightingale (19th Century) : An English nurse who won international fame for organising the modern type of nursing during the Crimean War.

Alfred Nobel (19th Century) : The Swedish inventor of dynamite Bequeathed his fortunes for instituting the Nobel Prizes.

George Orwell : English Novelist and satirist of the 20th century. Known for his satirical works 'Animal Farm' and 'Nineteen Eighty Four'. Many of his predictions for 1984 did not materialise.

Robert Owen (18th and 19th Centuries) : A British industrialist who was instrumental in initiating many labour welfare measures relating to factory workers.

Paderevski (19th and 20th Centuries) : An internationally famous pianist of Poland. The first Prime Minister of Poland when that State came into existence in 1919 as a result of the Treaty of Versailles.

Pericles (5th Century B.C.) : The ruler of Athens, under whom this Greek City-State rose to the pinnacle of glory.

Juan Person (20th Century) : A charismatic politician and President of Argentina who was loved by his people. Peronism still survives.

Phidias (5th and 4th Centuries B.C.) : A renowned sculptor of Ancient Greece.

Pablo Picasso (19th and 20th Centuries) : The most renowned of the Spanish painters. Known for his painting style known as 'Cubism'. His most famous painting is 'Guernica'.

Issac Pimtan (19th Century) : An English Publisher who popularised the short-hand system which goes by his name.

Platos (5th and 4th Centuries B.C.) : A renowned Greek philosopher and disciple of Secrates. His most famous political treatise 'The Republic'. Aristotle was his pupil.

Raphael (15th Century) : A famous Italian painter, known for his paintings of six Madonnas.

Rasputin (19th and 20th Centuries) : A Russian monk, nick-named 'rascal monk' because of the undue influence exercised by him over Tsar, Nicholas II, who was dethroned in the 1917 October Revolution. He was later murdered.

Rembrandt (17th Century) : A renowned Dutch painter and engraver.

Renoir (19th and 20th Centuries) : A French painter whose Impressionist paintings are master-pieces.

Reuter (19th Century) : The German founder of Reuters, a pioneer international news agency.

Robespierre (18th Century) : A prominent leader of the French Revolution who was later guillotined during the Reign of Terror.

Rockefeller (19th and 20th Centuries) : A millionaire of America who won a fortune through oil and was later known for his philanthropy and promotion of educational activities.

Rodin (19th and 20th Centuries) : A famous French sculptor.

Franklin D Roosevelt (19th and 20th Centuries) : The only person to be elected as the President of USA for four terms. Died in office. One of the founders of the UNO. His decision to participate in the Second World War ensured final victory to the Allies.

Bertrand Russell (10th and 20 Centuries) : A famous English essayist and philosopher. His campaigns for world peace brought him fame. A controversial writer.

Antonio Salazar : (19th and 20th Centuries) : A Portuguese military leader who established dictatorship in Portugal in 1932 and continued to rule till about his death in 1970.

Margaret Sanger : (20th) Century) : A social worker of USA who popularised birth control in modern times.

William Shakespeares (16th and 17th Centuries) : The greatest of the English dramatists. Born at Stratford-on-Avon, wrote his plays mainly for the stage.

Shi-Hwang-Ti (3rd Century B.C.) : The Chinese Emperor who started the building of the Great Wall of China to protect China from the onslaught of Huns.

Socrates : (5th Century B.C.) : A famous Greek philosopher who may be considered the pioneer of intellectual inquiry in the Western World. Condemned to death by poison by the Government of Athens.

Solomon : (10th Century B.C.) : A King of Jews known for his wisdom. Built the Jewish temple at Jerusalem, which was later destroyed by the Romans.

Joseph Stalin : (19th and 20th Centuries) : A leader of Communist Russia who succeeded Lenin by eliminating the other contestants. Established the Communist Dictatorship and ruled with an iron hand till his death in 1953.

Sukarno : (20 Century) : A leading freedom fighter of Indonesia, who became the first President of his country after Independence in 1945. He abdicated power in 1966 in the wake of popular unrest against this rule.

Suleiman the Magnificent : (16th Century) : The greatest of the Ottoman Sultans of Turkey.

Sun Yat Sen (19th and 20th Centuries) : The Chinese nationalist leader who abolished monarchy and established a Republic in his Country. Hailed as the founder of Modern China.

Thucydides : (5th Century B.C.) : The first renowned historian of the world. His history of the Peloponnesian War in Greek is well-known.

Leo Tolstoy (19th and 20th Centuries) : A Russian Noble who was known for his short stories and novels depicting his concern for social reforms and moral regeneration. His most famous work is 'War and Peace'.

Trotsky : (19th and 20th Centuries) : A communist leader of Russia who was the right-hand man of Lenin, but, after the latter's death, was removed from the scene by his opponent Stalin.

Van-Gogh : (19th Century) : A very famous Dutch painter.

Queen Victoria : (19th Century) : The British monarch who ruled for the longest period in British history (1852-1901).

Francois Voltaire (18th Century) : A French philosopher whose provocative writings were responsible for awakening the people in the 18th century-France resulting in the French Revolution.

George Washington (18th Century) : The foremost leader of the War of American Independence. Later became the first president of U.S.A.

Kaiser Wilhelm II (19th and 20th Centuries) : The Emperor of Germany, William II built his country into a formidable power in Europe towards the end of the 19th century and then started the First World War in 1914. After his defeat in the War, he abdicated and died in exile.

Abu Bakr (6th and 7th Centuries) : The first Caliph after Prophet Mohammed.

Amundsen (19th and 20th Centuries) : The first man to reach the North Pole. A Norwegian.

Octavius Augustus (1st Century B.C. and 1st Century A.D.) : The first Roman Emperor. The relative of Julius Caesar who was killed. After the conflict among the Triumvirate was over, he assumed the title of Roman Emperor.

Simon Bolivar (18th and 19th Centuries) : The South American freedom-fighter who was responsible for the liberation of the Spanish colonies in South America. In his honour, Bolivia is named after him.

Brahms (19th Century) : A German composer of international repute.

Chiang Kai Shek (19th and 20th Centuries) : A political leader of China whose party Kuomintang ruled China till it

was driven out from the mainland by the Communist army of Mao-Tse-tung in 1947. He settled in Taiwan, where he was the President of a Republic till his death in 1975.

Charles de Gaulle (19th and 20th Centuries) : A French General during the Second World War who later formed a Government in France. The Fifth Republic was introduced by him in 1959. Was the President of France till a year before his death in 1970.

Bartholomew Dias (15th Century) : A Portuguese navigator who was the first to sail round the Cape of Good Hope in 1488,

Epstein (19th and 20th Centuries) : A sculptor of Britain, considered to be one of the best during the 20th century.

Henry Ford (19th and 20th Centuries) : An American millionaire, whose name is closely associated with automobile production. Also a philanthropist.

Benjamin Franklin (18th Century) : An American scientist who took part in the War of American Independence and became a leading statesman and diplomat of USA.

Francisco Franco (19th and 20th Centuries) : Following a civil war between the rightists and the leftists in Spain, Franco, the leader of the rightists won and established a dictatorship in Spain which continued till his death in 1976. He named Juan Carlos to succeed him as king of Spain.

Gladstone (19th Century) : A British statesman who was the Prime Minister of Britain four times. A Liberal Party leader and renowned orator.

Robert Walpole (17th and 18th Centuries) : The first Prime Minister of England who held the office for a record period of 21 years.

Che Guevara (20th Century) : The Argentine-borne Cuban revolutionary who won international fame for his theory and practice of guerrilla warfare. He refused to hold any post in post-Revolutionary Cuba in order to continue the revolution in Latin America. Killed in an encounter with the police in Bolivia.

George Handel (17th and 18th Centuries) : A German composer of international repute.

Helen Keller (19th and 20th Centuries) : A deaf and blind woman of U.S.A. who did commendable social service for the welfare of the deaf and the blind throughout the world.

Ho Chi-Minh (20th Century) : A Communist revolutionary freedom-fighter of North Vietnam who as the President of his Country, successfully conducted the Vietnam War against the U.S. forces. He died before the settlement in 1975.

Magellan (15th and 16th Centuries) : A Portuguese navigator who was the first to sail around the world.

Metternich (18th and 19th Centuries) : A renowned diplomat of Europe. As the Austrian Foreign Minister, he played a major role in maintaining the balance of power in 19th Century Europe.

Mozart (18th Century) : A German composer acknowledged as the greatest musical genius of Europe.

Tenzing : An Indian Sherpa who was the first to climb Mount Everest in 1953 along with the team leader, Edmand Hillary.

Timur the Tamarlane (14th Century) : A Turkish warrior known for his military exploits and invasion of many parts of Asian and Europe.

Marshal Josif Tito (20th Century) : A military General of Yugoslavia who fought against the German occupation during the Second World War and later remained the President of Yugoslavia till his death in 1980,

Zoroaster (7th Century B.C.) : The Persian prophet who founded the Parsee religion (Zoroasterism).

QUESTIONS

1. Which of following throws light on Harappan Culture ?
 - (a) Rock Edicts.
 - (b) The writings in terracotta seals.
 - (c) Archaeological excavations.
 - (d) All the above. (1979)
2. The idol worship in India can be traced to
 - (a) the Pre-Aryan period.
 - (b) the later Vedic period.
 - (c) the Mauryan period.
 - (d) the Kushan period. (1979)
3. Mohammed of Ghazni attacked India, many times mainly
 - (a) to plunder the wealth of India.
 - (b) to establish his empire in India.
 - (c) to spread Islam in India.
 - (d) to take the famous artisans of India to his court. (1979)
4. Who is the Muslim ruler that enforced a strict price control system during his rule ?
 - (a) Iltutmish
 - (b) Alauddin Khilji.
 - (c) Mohammed bin Tughlaq
 - (d) Sher Shah Suri. (1979)
5. The earnings of the kings in the Medieval age were mostly derived from
 - (a) trade
 - (b) tariffs on trade
 - (c) temple offerings
 - (d) land revenue (1979)
6. 'Bijanti' government is compared to the Cholas for
 - (a) rural local self-government
 - (b) display of wealth.
 - (c) foreign conquests.
 - (d) system of land revenue (1979)
7. The most important reason for the fall of the Vijayanagar empire was
 - (a) Moplah's rebellion,

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- (b) economic bankruptcy.
(c) unity among the Deccan Sultanates.
(d) internal instability and internecine fights among the Princes. (1979)
8. 'Sufi Sect' developed in the religion
(a) Hinduism (b) Islam.
(c) Christianity (d) Sikhism. (1979)
9. The great Indian philosopher Sankara advocated
(a) Dvaita (b) Advaita
(c) Vishishtadvaita (d) None of the above (1979)
10. The influence of Chaitanya was mainly confined to
(a) The Eastern India (b) The Southern India
(c) Gujarat (d) North India (1979)
11. 'Mansabdars' during the Mughal period were
(a) Landlords and zamindars.
(b) Militia men
(c) Officials of the state
(d) Revenue Collectors. (1979)
12. During Aurangzeb's reign which of the following were not employed by his government ?
(a) Rajputs (b) Pathans
(c) Marathas (d) All the above (1979)
13. The first Europeans who started trade with Indian were
(a) British (b) Danish
(c) Portuguese (d) Dutch (1979)
14. The French challenge to the British supremacy in India came to an end with
(a) the Battle of Wandiwash
(b) the Battle of Buxar
(c) the Battle of Srirangapatnam
(d) the Battle of Plassey (1979)
15. The main factor that contributed to the final success of the British against the other European traders in India was
(a) superior business skills
(b) quality of merchandise

- (c) naval superiority
 - (d) good relations with Indian rulers. (1970)
16. The cause of the immediate precipitation of the Sepoy mutiny was
- (a) the spread of Christianity
 - (b) the Doctrine of Lapse
 - (c) the disparity between the European soldiers and the native Sepoys in service conditions.
 - (d) The compulsion on the Sepoys to use cartridges greased with fat. (1979)
17. Which of the following classes participated the least in the Indian National Movement ?
- (a) Capitalists
 - (b) Princes of States
 - (c) Governments officials
 - (d) The peasants (1979)
18. Who said first 'Swaraj is my birth right, and I shall have it' ?
- (a) Bal Gangadhar Tilak
 - (b) Gopal Krishna Gokhale
 - (c) M.K. Gandhi
 - (d) Lala Lajpat Rai (1979)
19. Who led the extremists before the arrival of Gandhi on the political scene for India's freedom struggle ?
- (a) Dadabhai Naoroji
 - (b) Surendranath Banerjee
 - (c) Gopal Krishna Gokhale
 - (d) B.G. Tilak. (1979)
20. The Home Rule movement was launched by
- (a) Annie Besant and B.G. Tilak together
 - (b) Annie Besant and B.G. Tilak separately.
 - (c) Annie Besant and Mahatma Gandhi together.
 - (d) The Congress when Mrs. Besant was its President. (1979)
21. Swadeshi movement started in India during
- (a) the Champaran Satyagraha of Gandhi.
 - (b) anti-Bengal Partition agitation.

- (c) the protest against the Rowlatt Act.
- (d) the first non-cooperation movement in 1919-22.

(1979)

22. The Lucknow Congress session of 1916 is noted for
- (a) the merger of the Muslim League with the Congress temporarily.
 - (b) the election of a Muslim President of the Congress.
 - (c) the concession given by the Congress to the Muslim League in the former's acceptance of separate electorates.
 - (d) None of the above.
- (1979)
23. Which of the following was *not* the outcome of Jallianwala Bagh massacre ?
- (a) Suspension of Gen. Dyer from service
 - (b) Temporary peace in Punjab.
 - (c) Renunciation of the British titles and positions by many Indians.
 - (d) Change in Gandhi's attitude towards the British Government.
- (1979)
24. 'Khilafat Movement' subsided because of
- (a) the concessions given to Muslims by the British.
 - (b) accession of Kemal Pasha to the throne of Turkey.
 - (c) the understanding reached between the Congress and the Muslim League.
 - (d) none of the above reasons.
- (1979)
25. The Swaraj Party was founded by
- (a) Motilal Nehru.
 - (b) B.G. Tilak
 - (c) C. Rajagopalachari.
 - (d) Vallabhbhai Patel.
- (1979)
26. The aim of the Swaraj Party was to
- (a) boycott the foreign goods.
 - (b) declare independence and establish a provisional Indian government.
 - (c) enter the Legislative Councils through elections in order to wreck the legislature from within.
 - (d) do all the above.
- (1979)

27. Gandhi organized Dandi March in 1930 against
- (a) imposition of tax on salt.
 - (b) atrocities on Harijans.
 - (c) the brutal repression of the British Indian government in the wake of the failure of the Round Table Conferences.
 - (d) the announcement of Communal Award. (1979)
28. During the Second World War, the Congress took the stand that
- (a) it would support the Allied Powers unconditionally.
 - (b) it would support the Axis Powers indirectly.
 - (c) it would cooperate with the British if a 'National Government' was formed during the war period.
 - (d) it would cooperate with the British if India was granted dominion status immediately.
29. The aim of the Cripps Mission to India was to
- (a) appease the Indian public opinion.
 - (b) decide the future of India immediately.
 - (c) grant independence to India in stages.
 - (d) decentralize power to provinces. (1979)
30. Which party was in power in the U.K. when India became Independent ?
- (a) Labour.
 - (b) Conservative.
 - (c) Liberal.
 - (d) No party, since a National Government was there. (1979)
31. Who evolved the national consciousness as a formal concept ?
- (a) B.G. Tilak
 - (b) Gandhi.
 - (c) Jawaharlal Nehru.
 - (d) Surendranath Bannerjee (1979)
32. The Interim Government at the Centre was formed in 1946
- (a) before the visit of the Cabinet Mission.
 - (b) after the visit of the Cabinet Mission.

- (c) after Mountbatten came to India for transfer of power to Indians.
- (d) as a result of the Cripps Mission. (1979)
33. Who was the Prime Minister of the U.K. at the time of India's Independence ?
- (a) Winston Churchill. (b) Ramsay MacDonald.
- (c) Clement Attlee. (d) Lord Mountbatten. (1979)
34. The slogan 'Inquilab Zindabad' was given by
- (a) Chandra Shekhar Azad
- (b) Mohammed Iqbal.
- (c) Bhagat Singh.
- (d) Gandhi. (1979)
35. 'Red Shirts' Movement aimed at
- (a) Creation of an independent Pakhtoonistan.
- (b) ensuring the creation of Pakistan.
- (c) making India a communist country at the dawn of independence.
- (d) throwing out the British from India (1979)
36. Bhagwad Gita was originally written in the language
- (a) Pali (b) Prakrit
- (c) Sanskrit (d) Hindi. (1981)
37. Megasthenes was sent by Seleukos Nikator to the court of
- (a) Chandragupta Maurya (b) Ashoka
- (c) Chandra Gupta I (d) Akbar (1981)
38. Coins came into existence in India
- (a) before 6th century B.C.
- (b) during Ashoka's period
- (c) in the third century A.D.
- (d) during the reign of Kanishka. (1981)
39. Which of the following can be compared to 'Prince' of Machiavelli ?
- (a) Kalidasa's 'Sakuntala'
- (b) Kautila's 'Arthashastra'
- (c) Vatsayana's 'Kamasutra'
- (d) Thiruvalluvar's 'Thirukkural'

40. 'Rajatarangini' is
(a) the collection of sayings of Kabir
(b) a book written by Guru Nanak
(c) a history book written by Kalhana
(d) the famous sword of Shivaji's family (1981)
41. Which of the following statements was *not* true of Amir Khusrau ?
(a) He was a poet.
(b) He was an accomplished musician.
(c) He was a symbol of Indo-Islamic culture.
(d) He was a disciple of Kabir. (1981)
42. Mohammed Bin Tughlak transferred his capital from Delhi to Daulatabad
(a) to punish the people of Delhi
(b) to protect his country from the attack of Mongols.
(c) to develop cultural and trade relations with the Deccan
(d) to control South India better. (1981)
43. Revival of Vedas is associated with
(a) Swami Dayanand Saraswati
(b) Swami Vivekananda
(c) Acharya Rajneesh
(d) Raja Ram Mohan Roy (1981)
44. Involvement of the masses in the Indian National Movement was there.
(a) from 1885 onwards
(b) between 1920 and 1947
(c) between 1915 and 1935
(d) only after 1930 (1981)
45. For which movement was there unanimous support of Hindus and Muslims in an unprecedented manner ?
(a) Champaran satyagraha
(b) Anti-Partition movement
(c) Khilafat movement
(d) Quit India movement (1981)
46. Which of the following is in proper chronological order ?

63. Ramanuja preached
 (a) Ahimsa (b) Gnana marga
 (c) Bhakti (d) Dvaida (1982)
64. Rajatharangini of Kalhana was
 (a) a collection of poems during the ancient period.
 (b) the history of Kashmir written in poetic form
 (c) a drama eulogising Harsha Vardana.
 (d) an account of the reign of Mihara Bhoja. (1982)
65. Arrange of the following items according to the chronological order of construction.
 I. Agra Fort II. Fatehpur Sikri
 III. Qutb Minar IV. Taj Mahal
 (a) I, II, III, IV (b) III, IV, I, II
 (c) III, I, IV, II (d) III, I, II, IV (1982)
66. The doctrine of lapse was introduced by
 (a) Lord Dalhousie (b) Lord Wavell
 (c) Lord Macaulay (d) Lord Lytton (1982)
67. Who among the following was *not* associated with the Revolt of 1857 ?
 (a) Tantia Tope (b) Lakshmi Bai
 (c) Bhagat Singh (d) Nana Sahib (1982)
68. 'Back to the Vedas' call was given by
 (a) Swami Vivekananda
 (b) Ramakrishna Paramhansa
 (c) Ravindranath Tagore
 (d) Dayanand Saraswathi (1982)
69. "India must unite and conquer the entire world once again" was said by
 (a) Raja Ram Mohan Roy
 (b) Vivekananda
 (c) Jawaharlal Nehru
 (d) Ramakrishna Paramahansa (1982)
70. Raja Ram Mohan Roy did *not* support
 (a) Sanskrit education (b) English education
 (c) abolition of Sati (d) Widow remarriage (1982)

71. Who among the following was not a Moderate ?
(a) Gopal Krishan Gokale
(b) Bal Gangadhar Tilak
(c) Ferozshah Mehta
(d) Surendranath Banerjea (1982)
72. The Civil Disobedience movement followed
(a) The declaration of Home Rule by Annie Besant.
(b) the partition of Bengal.
(c) Dandi March.
(d) the declaration of Poorna Swaraj by the Congress. (1982)
73. Dandi March was organised
(a) to protest against the communal award.
(b) to protest against the imposition of salt tax.
(c) to resolve the dispute between the Government and the agriculturists of Khera district.
(d) to protest against the visit of the Simon Commission (1982)
74. The Civil Disobedience movement failed because of
(a) Lack of interest shown by the people.
(b) Lack of interest shown by the top leaders.
(c) Lack of clear policy on the part of the Congress leaders.
(d) the repressive measures adopted by the Government. (1982)
75. The Cabinet Mission came to India
(a) to evolve a consensus on the constitutional question.
(b) to solve the communal problem of India
(c) to effect the Partition of India.
(d) to transfer powers to Indian formally. (1982)
76. The Indian National Congress was established by
(a) Gandhi (b) A.O. Hume
(c) Surendranath Bannerjee (d) Dadabhai Naoroji (1983)
77. Who wrote a book on economic drain of India during the British Period ?
(a) Gokhale (b) Annie Besant

(c) Dadabhai Naoroji (d) B.G. Tilak (1983)

78. Given below are two lists. Point out the response which gives the correct pairing.

- | | |
|-----------------------|--------------------------|
| A. Prarthana Smaj | 1. Rammohan Roy |
| B. Brahmo Smaj | 2. Vivekananda |
| C. Arya Smaj | 3. Dayanand |
| D Ramakrishna Mission | 4. Ramakrihna Paramhamsa |
| | 5. Ranade |

(a) A 5

(b) B 2

(c) C 4

(d) D 4

(1983)

79. The 'Quit India' Movement was launched in

(a) March 1930

(b) August 1940

(c) August 1942

(d) October 1945 (1983)

80. The capital of India was shifted from Calcutta to Delhi in

(a) 1910

(b) 1911

(c) 1912

(d) 1913

(1983)

81. Assertion (A) Britain granted indepedence to India in 1947. Reason (B) : Britain was weakened in World War II.

(a) Both A and B are true and B is the reason for A.

(b) Both A and B are true but B is not the correct reason for A.

(c) A is true but B is false.

(d) Both A and B are false.

(1983)

82. Which of the following is incorrectly paired ?

(a) Motilal Nehru

—Nehru Report

(b) Jinnah

—Khilafat Movement

(c) Gandhi

—Champaran Satyagraha

(d) Subhash Bose

—Forward Bloc (1983)

83. Who is regarded as the father of local self-government in India ?

(a) Lord Canning

(b) Lord Ripon

(c) Lord Lytton

(d) Lord Mayo (1983)

84. Chauri Chaura is the place

(a) Where Gandhi conducted his first Satyagraha in support of the indigo cultivators.

- (b) From where the Dandi March began.
- (c) Where a major communal riot took place.
- (d) Where violence erupted during the Non-cooperation movement.

(1983)

85. Who addressed the World Parliament of religions at Chicago in 1893?

- (a) Ramakrishna Paramhansa
- (b) Swami Vivekananda
- (c) Swami Dayananda
- (d) Dadabhai Naoroji

(1983)

86. Arrange the following in chronological sequence of their rule at Delhi,

I. Razia

II. Balban

III. Iltumish

IV. Nasiruddin

(a) IV, I, III, II

(b) I, III, IV, II

(c) I, II, III, IV

(d) III, I, IV, II (1983)

87. Which of the following is (are) correct?

A. Yugantar : Aurobindo Ghosh

B. Kesari : Tilak

C. Free India : Gandhi

D. New India : Annie Besant

(a) A and B only (b) A and D only

(c) B and D only (d) All of them (1983)

88. The Muslim League demanded separate Pakistan for the first time in

(a) 1939

(b) 1940

(c) 1941

(d) 1942 (1983)

89. Mahatma Gandhi's first satyagraha campaign in India was at

(a) Champaran

(b) Naokhali

(c) Baradoli

(d) Dandi

90. Which of the following pairs are correct?

1. Ellora Caves

—Rashtrakutas

2. Rock cut temples

—Chalukyas

3. Meenakshi temple

—Pallavas

4. Khujuraho

—Chandelas

(c) Dadabhai Naoroji : (d) B.G. Tilak (1983)

78. Given below are two lists. Point out the response which gives the correct pairing.

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| C. Arya Smaj | 3. Dayanand |
| D. Ramakrishna Mission | 4. Ramakrihna Paramhamsa |
| | 5. Ranade |

- | | |
|---------|---------|
| (a) A 5 | (b) B 2 |
| (c) C 4 | (d) D 4 |
- (1983)

79. The 'Quit India' Movement was launched in

- | | |
|-----------------|------------------|
| (a) March 1930 | (b) August 1940 |
| (c) August 1942 | (d) October 1945 |
- (1983)

80. The capital of India was shifted from Calcutta to Delhi in

- | | |
|----------|----------|
| (a) 1910 | (b) 1911 |
| (c) 1912 | (d) 1913 |
- (1983)

81. Assertion (A) Britain granted indepedence to India in 1947. Reason (B) : Britain was weakened in World War II.

- | |
|--|
| (a) Both A and B are true and B is the reason for A. |
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| (c) A is true but B is false. |
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- (1983)

82. Which of the following is incorrectly paired ?

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|-------------------|-----------------------|
| (a) Motilal Nehru | —Nehru Report |
| (b) Jinnah | —Khilafat Movement |
| (c) Gandhi | —Champaran Satyagraha |
| (d) Subhash Bose | —Forward Bloc |
- (1983)

83. Who is regarded as the father of local self-government in India ?

- | | |
|------------------|----------------|
| (a) Lord Canning | (b) Lord Ripon |
| (c) Lord Lytton | (d) Lord Mayo |
- (1983)

84. Chauri Chaura is the place

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|---|
| (a) Where Gandhi conducted his first Satyagraha in support of the indigo cultivators. |
|---|

- (b) From where the Dandi March began.
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| I. Razia | II. Balban |
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| (a) IV, I, III, II | (b) I, III, IV, II |
| (c) I, II, III, IV | (d) III, I, IV, II (1983) |

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|------------------|------------------------|
| A. Yugantar | : Aurobindo Ghosh |
| B. Kesari | : Tilak |
| C. Free India | : Gandhi |
| D. New India | : Annie Besant |
| (a) A and B only | (b) A and D only |
| (c) B and D only | (d) All of them (1983) |

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| 3. Meenakshi temple | —Pallavas |
| 4. Khujuraho | —Chandelas |

(c) Dadabhai Naoroji : (d) B.G. Tilak (1983)

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84. Chauri Chaura is the place

(a) Where Gandhi conducted his first Satyagraha in support of the indigo cultivators.

III. Civil Disobedience Movement ³⁰⁻³⁴

IV. Quit India Movement. ¹⁴⁴⁻²

(a) I, II, III, IV

(b) I, II, IV, III,

(c) II, I, III, IV

(d) IV, I, II, III (1983)

96. National Movement in India became an organised mass movement from

(a) 1857

(b) 1885

(c) 1905

(d) 1919 (1983)

97. Which of the following gives the correct chronological sequence of the events ?

I. Dandi March ¹⁹³⁰ II. Champaran Satyagraha ¹⁹¹⁷

III. Ghadar Party ¹⁹¹⁴ IV. Khilafat Movement ¹⁹²⁰⁻²¹

(a) I, II, III, IV

(b) III, II, IV, I

(c) I, III, IV, II

(d) III, I, IV, II (1983)

98. Which of the following was *NOT* an aim of the Subsidiary Alliance ?

(a) Increasing the British control over the Indian State

(b) Increasing the income of the British

(c) Protecting the country from Napoleon's invansion.

(d) Divesting the Indian princes and local rulers of much of their powers.

- (a) 1 and 2 only (b) 1, 2 and 3 only
(c) 1 and 4 only (d) All of the above
(1983)

91. Find the correct match in Lists (1) and (2) from the alternatives given below :

- | (1) | (2) |
|-----------------------|----------------------------------|
| I. Clive | A. Removal of Press Restrictions |
| II. Bentinck | B. Partition of Bengal |
| III. Charles Metcalfe | C. Dual Government in Bengal |

- | | |
|------------|----------------------|
| IV. Curzon | D. English Education |
|------------|----------------------|

- (a) I C, II D, III A, IV B
(b) I D, II A, III C, IV B
(c) I B, II D, III C, IV A
(d) I C, II B, III C, IV D. (1983)

92. Three close associates of Gandhi died recently. They were

- (a) Mira Behn, M.R. Desai, Pyarelal.
(b) M. R Desai, Pyarelal, M.O. Mathai.
(c) M.R. Desai, Anandmai Ma, Mira Behn.
(d) Mira Behn. Anandmai Ma, M.R. Desai. (1983)

93. Pick out the wrong pair :

- | | |
|-------------------------|--------------------|
| (a) Simon Commission | —appointed in 1927 |
| (b) Partition of Bengal | —1906 |
| (c) Chinese invasion | —1962 |
| (d) Death of Nehru | —1966 (1983) |

94. Who among the following were the contemporaries of Kanishka ?

- | | |
|-------------------|-------------------------|
| I. Asvagosha | II. Vasumitra |
| III. Kalidasa | VI. Kambar. |
| (a) I and IV only | (b) II and III only |
| (c) I and II only | (d) All of them. (1983) |

95. Which of the following gives the correct chronological sequence of the events ?

- I. Non-cooperation Movement
II. Swadeshi Movement

III. Civil Disobedience Movement ³⁰⁻³⁴

IV. Quit India Movement. ⁴⁴⁻²

- (a) I, II, III, IV (b) I, II, IV, III,
(c) II, I, III, IV (d) IV, I, II, III (1983)

96. National Movement in India became an organised mass movement from

- (a) 1857 (b) 1885
(c) 1905 (d) 1919 (1983)

97. Which of the following gives the correct chronological sequence of the events ?

I. Dandi March ¹⁹³⁰ II. Champaran Satyagraha ¹⁹¹⁷

III. Ghadar Party ¹⁹¹⁴ IV. Khilafat Movement ¹⁹²⁰⁻²¹

- (a) I, II, III, IV (b) III, II, IV, I
(c) I, III, IV, II (d) III, I, IV, II (1983)

98. Which of the following was *NOT* an aim of the Subsidiary Alliance ?

- (a) Increasing the British control over the Indian State
(b) Increasing the income of the British
(c) Protecting the country from Napoleon's invansion.
(d) Divesting the Indian princes and local rulers of much of their powers.

ANSWERS

1. Ans. (c) No rock edicts have been identified with Harappan Culture. The writings on the seals have not been deciphered.
2. Ans. (a) The idol worship in Indian can be traced to the Harappan Civilisation which is definitely pre-Aryan.
3. Ans. (a) Although Mohammed had the intention of carving out parts of India to annex to his empire, he had no intention of establishing an Empire in India as such.
4. Ans. (b).
5. Ans. (d) The kings collected tariff on trade. But the total collection amounted to very little compared to the land revenue. The Medieval kings did not carry on trade.
6. Ans. (b) Bijanti Government' here refers to the Vijayanagar Kingdom.
7. Ans. (c). Although there was some instability because of the internecine conflicts among the Princes for succession, the more important reason for the fall of Vijayanagar Kingdom was that the Deccan Sultanates, which were generally in loggerheads among themselves, combined to crush Vijayanagar.
8. Ans. (b).
9. Ans. (b).
10. Ans. (a). Chaitanya Mahaprabhu was an exponent of Krishana Cult in Bengal.
11. Ans. (c). Although Mansabdars were allotted land grants instead of salaries, they were originally appointed on a non-hereditary basis.
12. Ans. (c). Aurangzeb did not trust the Marathas and hence did not appoint them in his government, although certain Marathas chiefs were conferred 'mansabs'.

13. Ans. (c). The order in which the Europeans came to trade with India is : Portuguese, British, Dutch French.
14. Ans. (a).
15. Ans. (c) The naval superiority of the British over all the other European States in 18th and 19th centuries, was well established all over the world. We cannot say that the British possessed superior business skills or maintained better relations with the native rulers.
16. Ans. (d) Responses (a), (b) and (c) are factually true but were not the immediate causes of the Sepoy Mutiny.
17. Ans. (b) The Princes of States did not have any interest in participating in the National Movement, since their position was equally jeopardized by the Movement. Although capitalists, government officials and the peasants did not take part in large numbers, some members of these classes did participate in the Movement.
18. Ans. (a).
19. Ans. (d).
20. Ans. (b).
21. Ans. (b) Although theoretical support to Swadeshi was there before 1905, only during the Anti-Partition Movement, the Indian Nationalists resorted to Swadeshi on a large scale.
22. Ans. (c) The Lucknow Congress Session is also noted for the reunion of the Extremists and the Moderates.
23. Ans. (b) In course of time, after an inquiry Gen. Dyer was suspended from service. One cannot say definitely that there was a change in Gandhi's attitude towards the British Government. He should have been already aware of imperialist attitude and repressive policies of the British Government. Following the massacre, there were continuous disturbances in Punjab for a few months in 1919.
24. Ans. (b).

25. Ans. (a) Motilal Nehru and C.R. Das were responsible for starting the Swarajist Party within the Congress.
26. Ans. (c).
27. Ans. (a) The Congress had decided in its annual session of 1929, to start the Civil Disobedience Movement. It was as a part of this programme that Gandhi organised the Dandi March. However, he chose the salt tax for breaking the law.
28. Ans. (c) The Congress was ready to co-operate with the British Indian Government on fulfilment of certain conditions, stipulated at different times in the course of the War. Regarding the interim arrangements, it may be said that the Congress wanted the formation of a National Government so that Indians may voluntarily contribute to the war efforts of the Government.
29. Ans. (a) The answer is to be chosen between response (a) and response (b). The Cripps' Mission was interested in finding a long term solution to India's constitutional question, and hence was to decide on the future of India also. However, its primary aim was to appease the Indian public opinion in the light of the difficult situation faced by Britain in the Second World War.
30. Ans. (a).
31. Ans. (d) Surendranath Bannerjee is considered 'the father of Indian Nationalism's.
32. Ans. (b) It was as a part of the Cabinet Mission Plan that the Interim Government was formed in 1946.
33. Ans. (a).
34. Ans. (b) Although the slogan was freely used by many Indian national leaders, it was coined and used by Mohammed Iqbal in his writings.
35. Ans. (d) The 'Red Shirts' Movement was led by Ghaffar Khan who was a close associate of Mahatma Gandhi and was opposed to Jinnah.
36. Ans. (c).
37. Ans. (a).

38. Ans. (a) Actually metallic coins were issued for the first time in India in the Mahajanapadas of the Gangetic Plain in 6th century B.C.
39. Ans. (b) Both 'Prince' and Arthashastra' are treatises of political science and international relations.
40. Ans. (c).
41. Ans. (d).
42. Ans. (d).
43. Ans. (a) Dayanand Saraswati gave the slogan 'Back to the vedas'. Swamy Vivekananda is associated with revival of interest in Vedanta.
44. Ans. (b) Masses were involved in the National Movement only after Gandhi took over the leadership of the Congress in 1919.
45. Ans. (c) Since Gandhi was the President of All-India Khilafat Committee, the participation of Hindus in the Khilafat movement was assured. During the Anti-Partition Movement, sizable sections of the Muslims supported the government and the scheme of Partition.
46. Ans. (d) To protest against the Rowlatt Act, an All-India strike was organised by Gandhi. As a continuation of that, the Jallianwala Bagh massacre took place. The Hunter's Committee of inquiry was appointed by the Government to inquire into this massacre and other disturbances in Punjab.
47. Ans. (a) The Non-Cooperation Movement was suspended mainly because of the Chauri Chaura incidents in 1922.
48. Ans. (a) Although Netaji was not the founder of the INA, he headed it from 1942 till its collapse in 1945.
49. Ans. (a) The day was celebrated at the instance of the Congress.
50. Ans. (c) The British Prime Minister Mr. Attlee made the announcement regarding the transfer of power to Indians on 20th February 1947 when Lord Wavell was the Viceroy.
51. Ans. (b)

52. Ans. (d).
53. Ans. (d).
54. Ans. (c) Gandhi considered Gokhale, a Moderate Congress leader, as his political mentor and came to India to take part in politics at the instance.
55. Ans. (a).
56. Ans. (d) The unique drainage system is the characteristic feature of all the cities of the Harappan Culture. Since Lothal is one of them, we can associate it with this city also.
57. Ans. (c) Although many claim to have deciphered the Indus Script, no one has so far produced a satisfactory transcript of all the writings.
58. Ans. (a) The Tripitakas are 'the three baskets' containing the teachings of Buddha.
59. Ans. (c) This era that is called Saka era was commenced by the Kushan ruler, Kanishka. The Sakas had ruled earlier.
60. Ans. (a).
61. Ans. (c) There was no standard method prescribed or followed for accession to the throne in the Delhi Sultanate or in many other Kingdoms of India.
62. Ans. (c) Guru Nanak did not establish a separate religion during his life time. His followers were instrumental in establishing the Sikh religion.
63. Ans. (c) Ramanuja preached Vishishtadvaita.
64. Ans. (b) It is worth noting that this question has been repeated from the earlier year.
65. Ans. (d) Qutb Minar was built by Iltutmish. Agra Fort was built by Akbar Fatehpur Sikri was by Akbar to be his capital. Taj Mahal was built by Shah Jahan.
66. Ans. (a).
67. Ans. (c) Bhagat Singh was associated with the revolutionary terrorism in the 20th century.
68. Ans. (d) This question has been repeated from last year, in a slightly different form.
69. Ans. (b).

70. Ans. (a) Raja Rammohan Roy supported English education as against Sanskrit education in the Orientalists versus Occidentalists controversy.
71. Ans. (b) All the other national leaders were prominent Moderates.
72. Ans. (d) In the Congress session at Lahore in December 1929, the declaration or Poorna Swaraj was made and the Congress decided to organise the Civil Disobedience Movement. As a sequel to this decision, the Dandi March was organised.
73. Ans. (b) When Gandhi wanted to start the Civil Disobedience Movement he chose the salt law for violation on the ground that imposition of tax on salt was against his conscience.
74. Ans. (d) Although repressive measures were certainly adopted by the Government against the national leaders, the waning of the C.D. Movement could not be attributed only to the repressive measures. However, after the arrest of the national leaders in 1931, the Movement could not be sustained for lack of leadership.
75. Ans. (a) The Cabinet Mission came to India with an open mind to decide on the future constitution of India. It did not have the mandate for the formal transfer of power to Indians. Similarly it was not the intention of the Mission to deal with the communal problem of India as such.
76. Ans. (b).
77. Ans. (c).
78. Ans. (a) The proper pairings are A5, B1, C3 and D2.
79. Ans. (c).
80. Ans. (c) The transfer of capital to Delhi was announced in 1911 and was implemented in 1912.
81. Ans. (a) Statement B indicates one of the reasons for A.
82. Ans. (b) Jinnah did not play a prominent role during Khilafat Movement ; at that time he was an unimportant leader.

83. Ans. (b).
84. Ans. (d).
85. Ans. (b) Swami Vivekananda's speech in the Parliament paved the way for Westerners' understanding of India's rich Cultural heritage.
86. Ans. (d).
87. Ans. (c) 'Yugantar' was published by Barinder Ghosh, brother of Aurobindo Ghosh. The journals published by Gandhi are 'Young India' and 'Harijan'.
88. Ans. (b).
89. Ans. (a).
90. Ans. (c) Rock-cut temples are associated with Pallavas ; Meenakshi temple, with Naik rulers of Madurai.
91. Ans. (a).
92. Ans. (a) Anand Ma was not an associate of Gandhi.
93. Ans. (b) Partition of Bengal was in 1905.
94. Ans. (c) Kalidasa lived during the period of Guptas. Kambar lived in the period of the Great Cholas.
95. Ans. (c) The proper sequence is : Swadeshi Movement (1905 to 1907) ; Non-Cooperation Movement (1920-1922) ; Civil Disobedience Movement (1930-34) Quit India Movement (1942).
96. Ans. (d),
97. Ans. (b) Ghadar Party (1914) ; Champaran Satyagraha (1917) ; Khilafat Movement (1920-1924) ; Dandi March (1930).
98. Ans. (b).

PART II
INDIAN POLITY

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The chapters which follow are meant to impart to the candidates a basic understanding of the important political concepts and of the working of the Indian Political System. Such knowledge is essential to answer a set of questions under the heading, which generally goes by the name 'Indian Polity'. Although the number of question relating to this Part of General Studies is not quite substantial, [compared to some other Parts this Parts is, nevertheless, important for a competition candidate. There are numerous aspects of politics and political system. A comprehensive coverage of all of them from the point of view of a detailed study is not possible in a terse treatment as in the following chapters. Nevertheless one will acquire substantial understanding of political matters by going through what is written here. The bulk of the questions in Indian Polity relate to the Indian Constitution. So a fairly detailed treatment of the essential provisions of the constitution is attempted here. It is not necessary for the candidates to remember the Artical numbers, except in the case of the most important provisions. What is important for the candidates is to learn the language of the constitution and to cope with legal terminology used. This will provide them with a solid background for their preparation for the IAS Main Examination.

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Political Terminology

Political System : A set of relationships of a political nature i.e. a set of inter-relationships involving policy decisions enforceable mainly through the coercive power of the state. The system consists not of individuals but of their functions and inter-relationships.

State : A community of persons occupying a definite territory with independence and having an organised government. The four essential elements of a State are fixed territory, population, government and sovereignty.

Government : The agency through which the will of the state is expressed. There are different forms of government but the state does not have different forms.

Sovereignty : An essential attribute of a state. Internal sovereignty means supremacy over all individuals and groups within the state. External sovereignty means independence from foreign control.

Nationality : A psycho-political concepts. Refers to a segment of society united on the basis of sentiment of unity on any of the following grounds i.e., religion, language, race, geographical contiguity, commonness of aspirations and ideals, historical experiences etc.

Nation : Nationality plus political unity.

Multy-National State : State consisting of more than one nations e.g. U.S.S.R., Yugoslavia etc.

Utilitarianism : The political philosophy which holds that the basic purpose of the State is to be found in its utility for the people. The motto of the utilitarian state will be 'the greatest happiness of the greatest number of people.'

Collectivism : The ideology which advocates collective economic activities in the society. Collectivism is practised in the Communist countries and in the Fascist States.

Imperialism : As an ideology, it advocates extension of boundaries a state through conquest. The justification offered for such conquest is that the people in the other countries will benefit from the enlightened rule of the Imperialist Power. Marx describes Imperialism as the last stage of Capitalism. In practice Imperialism means establishment of an empire through conquest of neighbouring countries.

Colonialism : In theory colonialism advocates subjugation of other countries or people so that they may subserve the Colonial Power. A Colonial Power expects the Colony to produce raw materials for export to the Colonial Power ; in return, the Colony is expected to buy the manufactured goods from the Colonial Power. This set of economic operations result in the drain of wealth of the colony and the impoverishment of its people. Another form of Imperialism with this main difference that the conquered countries or areas are far away from the colonising state.

Democratic Centralism : The ideology followed by the Communist countries with regard to organisation of Government. The state power is concentrated at the central Presidium. But the Presidium is expected to have a democratic base.

Materialism : The philosophy which holds that there is nothing but matter in the universe. It denies the existence of mind, ideas, spirit and spiritualism.

Idealism : The philosophy which holds that the universe is run and controlled by ideas or spirit. Idealist philosophers emphasize the superemacy of the mind over matter.

Dialectics : The process of progress of a society, enunciated by Hegel and adapted by Marx to explain the course of history. The mechanism of this process is explained in terms of thesis, anti-thesis and synthesis. Hegel developed dialectical idealism ; Marx based his ideology on dialectical materialism.

Economic Determinism : An essential component of the Marxian philosophy. According to it, the stages and course of history are determined by economic forces only. The idea is to emphasize that other aspects of life like political institutions and ideas do not control or influence the course of history.

Individualism : The philosophy which emphasizes that the individual is the centre of the universe and hence should be subserved by all institutions, including the state and society. In other words, the primary consideration for the policies of the state and of other institutions in the society should be the progress of the individual. It is opposed to collectivism.

Elite : A select group. A small group of persons who hold power or control human affairs in the field.

Elitism : The ideology which holds that the natural situation in any society or state is for the elite groups to lead and to rule the masses. The elitist theory of democracy advocates that only through formation of elite groups democracy can produce optimum results.

Philosophical Radicalism : The ideology advocated by political philosophers like Bentham and Hume. They were positive liberals who advocated the utilitarian theory of state and were non-conformists. They stood for major social reforms without revolution.

Fascism : The ideology advocated and practised by the Fascist Party of Mussolini in Italy. It emphasises the central role of state in all aspects of life of the individual and the society. Based on Hegelian theory of state, it expects individuals to sacrifice everything for the sake of the state as manifested in the form of the Government. Rooted in irrational approach to life. Fascism emphasizes un-critical and unquestioning obedience to the state and to the supreme leader. In practice the term is used whenever a political party or a supreme leader expects unquestioning loyalty or obedience from the followers.

Leninism : The theory developed by Lenin to elaborate

and explain Marxism in practice. Leninism deviates significantly from the Marxian ideology in certain aspects.

Maoism : The theory developed by Mao-Tse-tung. While applying Marxism and Leninism to the realities of China, Mao advocated certain theoretical and practical deviations from them. While upholding that 'power flows from the barrel of the gun', Maoism places the peasants on par with the proletarians in class struggle and emphasizes 'continuing revolution.

Absolutism : The political philosophy which holds that the ruler or king has absolute and unquestionable powers over the subjects and can deal with them at will. The theory was developed during the Medieval Period to support the autocratic rule of kings. The theory of divine right of kings is associated with it.

Neo-imperialism : The term used to refer to the new form of imposition of the will of a superior Power over less powerful states. While, in theory, these countries are sovereign, in reality their rulers submit to the dictates of the superior Power out of fear or for winning favours.

Neo-colonialism : The term used to refer to a new form of colonialism in which the erstwhile colonies or other small countries are expected to operate their economic system, in the colonial pattern, in order to subserve the interests of the erstwhile Colonial Powers or some others superior Power. Often, the operation of the international economic system compels them to do so.

Constitutionalism : The ideology which advocates that everything in a state and every action of the government should be in accordance with the constitution. Non-constitutional practices and extra-constitutional authorities are denounced.

Industrialism : The ideology which emphasises the need for developing the modern industries in a country so that it may be in the fore-front of the race for material progress.

Intelligentsia : The collective noun refers

educated idealogists who provide leadership to the community. They generally do not form a collective organisation.

Feudalism : The system of government and economy that prevailed in Europe during the Medieval Ages. According to this system, the king was assisted by the nobility which was hereditary. The nobility, consisting of different ranks like knights, lords and dukes acknowledged the sovereignty of a king, but were functioning more or less independently in their own territories. They also controlled the economic system within their territories. Eventually feudalism gave way to modern capitalism and nation-states.

Patriotism : As an ideology, it advocates that a citizen or subject of a state should give his supreme loyalty to the state. In common parlance, the term means the sentiment of attachment and loyalty to one's Motherland.

Nationalism : The ideology which emphasizes the role of the nation as the supreme institution in a society. It advocates that a citizen or subject should be ready to sacrifice himself, his family, his clan or community for the sake of the nation. Originally nationalism arose in Europe as a reaction against the superemacy of the Holy Roman Emperor and the Church on the one hand and against feudal loyalties on the other.

Republicanism : The ideology which emphasises the republican aspects of the state i.e., all state posts should be non-hereditary.

Zionism : The term refers to the ideology of the Zionist Movement which advocated aggressive assertion of the Jewish identity. The Movement directed its energy initially against Hitler's Nazism and later turned against the Arabs demanding Palestine homeland.

Civil Disobedience : The technique of democratic protest which advocates symbolic breaking of a law without indulging in violence. The protest is directed against the government.

Strike : Also called Hartal. A form of protest against the government or any authority in which the productive

activities in a particular territorial or functional area are stopped or made to stop by the workers or other interest groups including political parties.

Closure : A form of Protest in which certain establishments (educational, business or industrial) are closed for a day or more. The closure may be voluntary by members who have some grievance against the government or may be forcibly effected through other protestors

Sit-in Strike : Also called Pen-down strike. A form of strike in which the workers or employees remain in their work-spots during working hours but do not work. 'Go-slow' or 'work-to-rule' are similar forms of strike.

Demonstration : A form of democratic protest in which the aggrieved groups of citizen form an assembly and express their protest against government or particular authority through noisy statements or slogans.

Sit-down Demonstration : Also called 'Gherao'. A form of demonstration in which the protestors sit around and block the movement of the authorities (generally officials of the government) in a particular place. Such a strike is generally illegal.

Picketing : A form of protest in which the protestors prevent the people from taking part in the work of an office or establishment or in the sale of a shop.

Hunger Strike : A form of protest in which the protestors sit down at a particular place (or remain in jail) without taking food for a stipulated period.

Hijacking : The operation of diverting an aeroplane (or any other mode of transport) from its normal route in order to hold the crew and passengers as hostages and to press for the fulfilment of certain demands. Hijacking is an offence in most countries of the world.

Sabotage : International damage to machinery, materials or transport routes with a view to stopping the normal working of an industry or a transport system. Generally indulged in by criminals, dissatisfied workers, political opponents or enemy aliens.

Consensus : A process of decision-making When all the members of a decision-making body or all interested parties to an issue subscribe to a common decision after resolving their differences of opinion, a consensus is arrived at. e.g. National consensus in India exists in matters like family planning, defence, universal primary education etc. This means that the people and political parties in India are agreed on these matters. Leadership tussles within a party or group may be resolved through consensus.

Containment : A policy which aims at containing (restricting) the influence or role of another party or country beyond the territorial or functional region where it is already having substantial influence. This term may be applied to the efforts of the ruling party to prevent the spreading out of an opposition party. In International Politics, the same term is applied to the policy followed by a major Power to contain the influence of another state in a particular region.

Sanctions : The actions, by way of penalty or punishment, which a government or any other organisation is capable of taking against an erring member or person outside, if he is not amenable for correction. For the state, the sanction is the force i.e. police force. In the international community, sanctions against a state may be in the form of embargo of goods, boycott of the country in common functions etc.

Moratorium : An order authorizing the postponement of payment of dues without imposition of punishments. The governments periodically announce moratorium on bank loans to help the peasants at time of drought or other natural calamities.

Stop Press : A small column in a daily newspaper earmarked for the insertion of the latest news.

Time Capsule : A weather-proof box containing a written record of events of a particular period of near history. It may be embedded into the earth or placed in the bed of a well so that it may be available for authentication of history for the people in the remote future.

Ultimatum : A note of warning issued by one party to another stating that unless a particular demand is met within the time limit prescribed, some drastic action or punishment will follow.

Veto : A component of decision-making process. When a decision made by an individual or a body can be nullified or stopped from implementation, through the decision of the second person or body, the second person is said to exercise the veto. Generally the veto power is vested in a superior authority or person.

Universal Adult Franchise : Also called Adult Suffrage. The election system which gives voting right to all the adult (person beyond a particular age) citizen irrespective of status, property or education. This election system prevails in a democracy. Suffrage means vote. Franchise means voting right and other citizen's rights.

Mid-Term Poll : Also called snap poll. The poll (election) which is conducted at short notice. This election is held in between the normal term of a legislative body. A snap poll may be ordered if the government falls or feels that the time is opportune for its victory in the next poll.

Bye-election : The election to fill a seat in a legislative body which has fallen vacant in the middle of the normal term of the body, owing to death, resignation or disqualification of a member.

General Elections : This term is applied when elections are conducted for a new Lok Sabha in India. Elections for some other State Legislative Assemblies also may be held about the same time.

Amnesty : A general pardon that is granted to the prisoners, generally during a major national celebration. The same term may be applied when the prisoners of war are granted a general pardon by the government of a country.

Curfew : An administrative order of the government authority which prohibits people of an area from coming out into streets or roads. This is resorted to by the government

in an extremely difficult law and order situation. A curfew-violator may be punished.

Concentration Camp: A camp to torture the inmates, generally enemies or prisoners. Such camps were set up in large number in Hitler's Germany. Nowadays concentration camps are prohibited by the U.N. Declaration of Human Rights.

Four Freedoms: The four freedoms which President F.D. Roosevelt of U.S.A. considered as essential for all human beings in the world, irrespective of difference in political system. The freedoms are freedom of speech and expression, freedom of religion, freedom from want and freedom from fear. According to him the U.S.A. took part in the Second World War in order to protect these freedoms.

Prohibition: Prohibition of intoxicating drinks and drugs, particularly alcohol.

Protocol: The rules regarding treatment and ceremonies to be observed while entertaining important dignitaries, domestic and foreign.

Human Rights: The essential rights which human being in all countries, require for their normal development and are expected to be made available to them by the governments irrespective of differences in the political systems.

Fifth Column: A derogatory term used for betrayers of national interest.

Spy: A person engaged in collecting intelligence or information regarding one country or group in order to pass on the information to the opposite country or group for their benefit. A double spy crosses sides and seeks remuneration from both sides.

Fourth Estate: Refers to the press. In the Medieval European king's court, there used to be three estates, those of nobility, clergy and the common people. Press was non-existent then.

Hawks and Doves: The terms are applied to persons or articulate groups which advocate strong/mild views and steps regarding any issue or matter. The terms are relative.

Initiative : A legislative process which prevails in certain democracies such as Swiss Cantons. The voters may take steps to initiate legislation by following certain procedures and conditions.

Recall : The device in a democracy by which the voters of a constituency may revoke their mandate to their representative in the legislature because of his incompetence or unsuitability and may recall him.

Referendum : A democratic device used in some constitutional states, by which important legal or constitutional questions or constitutional amendments are referred to the people directly for final decision.

Plebiscite : The democratic device, used in constitutional states, by which important political questions, particularly questions relating to the status of a region, may be referred to the people of the region for their final decision.

Fragmentation : Splitting of political parties in a multi-party system. If parties keep on splitting and proliferating, the stability of the political system will be threatened.

Polarisation of Political Parties : In a multi-party state, the term applies to the process by which the political parties club themselves together into two major opposite fronts. Polarisation is desirable for stable government.

Splinter Groups : The term generally applies to the small political groups in the legislature or outside which do not have clear programmes or ideologies. Personality clashes and, some time, ideological cleavages may lead to the formation of splinter groups.

Manifesto : The document issued, generally before a major election, by a political party outlining its policies and programmes. It is generally read out from a platform in a political gathering. A lot of 'election promises' are listed in a manifesto.

Bureaucracy : A collective name for the officials of the state. Sometimes the term is reserved for the higher officials who guide the Government in making all decisions. Non-officials who hold political executive posts for short tenures are not included within the ambit of bureaucracy.

Government Servant : An employee of the Central Government or a State Government. He may be holding a civil or defence post or be member of a Civil Service or an All-India Service or a Defence Service.

Civil Servant : All government servants except the ranks and officers of the three wings of the Military. The latter are sometimes known as 'service personnel'.

Public servant : All government servants, employees of local bodies and those who are holding constitutional posts such as the President, the Governor, Ministers, Judges of Supreme Court and High Courts etc.

Cabinet : The collective body consisting of Minister of Cabinet rank and headed by the Prime Minister, or Chief Minister as the case may be.

Ministry : Also known as Council of Ministers. The cabinet is the main part of the council of ministers. The other ministers are ministers of state, and deputy ministers. Sometimes parliamentary secretaries of rank lower than the deputy ministers are also appointed, but they are not members of the Ministry.

Anarchy : The state of affairs in a political community when there is no State. Anarchism is the ideology which demands the abolition of a state on the ground that it is an unnecessary evil.

Autocracy : The rule by an individual and according to the will of the individual. The ruler does not bother about the welfare of the ruled or their consent. Such a rule generally results in the oppression of the people.

Censorship : State control over the media. The rulers resort to censorship when they want to suppress dissent. Nowadays the media i.e. newspapers, cinema and broadcasting are subjected to censorship all over the world ; only the degree of censorship varies. When a book is banned from circulation the term used is proscription.

Checks and Balances : The method generally employed by a government to ensure that excess committed by one organ of the state or government is noticed and corrected by one of

more other organs of the government. In the context of separation of powers, checks and balance have become important in modern democracy.

Citizenship : The basic right conferred on bulk of the persons residing within the territory of a state. Citizenship enables a person to enjoy civil and political rights.

Conservatism : The philosophy which seeks to conserve (preserve) the existing state of affairs. The Conservatives are generally considered backward.

Reactionary : The person who wants to go back to the past or seeks to reverse the onward march of the society, economy or polity.

Revisionism : The ideology which advocates going back on the existing progressive policies and steps. The term is generally used by a section of communists who criticise the other section which is considered reactionary.

Ideology : A set of ideas or theories which, together, prescribe a world view and generally advocate a particular type of political system, government or state.

Socialism : The basic tenet of socialism is the social ownership of the means of production. There are different brands of socialism such as Fabian Socialism, Guild Socialism, Syndicalism Evolutionary Socialism, Democratic Socialism and Marxism which claims to be scientific socialism. Communism according to the Marxian theory is the ultimate form of Socialism.

Fabianism : The brand of Socialism advocated by the Fabian Society. It aims at bringing about socialism in a country through democratic set-up. Akin to democratic socialism.

Guild Socialism : A brand of socialism which aims at transferring of the state powers to the Guilds of workers.

National Socialism : A brand of socialism which was developed in Hitler's Germany. The Nationalist Socialist (Nazi) party combined certain postulates and techniques of socialism and nationalism in order to reinforce the imperialist dictatorship of Hitler.

Democratic Socialism : The political and economic ideology

which seeks to realize the goals of socialism through democratic means. The operation of the economic system along socialist within a democratic polity.

Marxism : The philosophy and Ideology advocated by Karl Marx. The main components of Marxism are materialistic interpretation of history, economic determinism, class struggle, dictatorship of the proletariat and communism.

Class Struggle : In the Marxian theory, class struggle is an inevitable phenomenon in a state. According to Marxism, the basic antagonism between different classes cannot be resolved smoothly and hence the class conflict. Marxists hold that the class struggle between the bourgeoisie and the proletariat will result in victory for the latter.

Communism : In a community where the maxim 'from each according to his ability, to each according to his needs' applies to the economic system, there is no need for the state. Communism is said to prevail in such a political community. According to Marxists, the establishment of the dictatorship of the proletariat will result in the withering away of the state and communism will be ushered in. In common parlance, the term 'Communism' is used to refer to the political system prevailing in countries like U.S.S.R., People's Republic of China etc.

Liberalism : The philosophy or outlook which emphasises the liberty of the individual. The state was considered an instrument to promote the liberty and happiness of individuals. Negative liberalism which flourished during the 17th and 18th centuries emphasised *laissez faire* in economic matters and minimum state interference in political matters. State, under negative liberalism, would be a police state. Positive liberalism, which developed in the 19th century as a reaction to the threat of communism advocated a developmental role to the state and wanted the state to provide social welfare measures for the benefit of all.

Welfare State : The ideology that rose as a reaction against the evils of Capitalism and the prospects of socialism in the 19th century. It emphasises the need for the state to attend to the bare minimum needs of the common man, through

social welfare measures whose benefits can be enjoyed by all the citizens in a state. Many democracies in Western Europe now a days subscribe to the ideology of Welfare State.

Social Democracy : The ideology of the social Democratic Parties in Europe. They emphasize democracy and, within its frame work, advocate socialist objectives.

Internal democracy : The application of democratic principles and prevalence of democratic practices in the working of a political party. The leadership tussles within party are settled through democratic means.

Hero Worship : Also called personality cult. A form of inter-relationship between a leader and the followers. The followers exhibit unquestioning and absolute obedience to the leader, treating him as a legendary hero. Hero worship is not desirable for a mature democracy, but it advocated in the states subscribing to fascism or Communism.

Coalition Government : A government formed by a Legislature Front Consisting or more than one Legislature parties. A coalition government is formed when no single party commands a clear majority in the legislature.

Coup : Also called coup d'état. A sudden change of government, generally accompanied by violence. After a coup, military rule is normally established.

Junta : A collective body, consisting of military men which imposes military rule in a country.

Politburo : A small group of partymen who control the affairs of the party from its headquarters. Generally the term is associated with the communist Party.

Police State : A government which rules with an iron hand, ignoring the normal rights of the people. Military rulers and despotic kings generally run a police state. The same term is sometimes used in other sense also. The state attends to the police functions only, ignoring the welfare and developmental aspects. Nowadays no state is a police state in this sense.

Parkinson's Law : A law in public administration which states that the bureaucracy has the tendency to grow i.e.

increase its number in the course of time. 'Official make work for each other.'

Red Tape : The official conduct of postponing decisions and delaying implementation of policies, quoting rules and regulations as hurdles. A defect associated with bureaucracy.

Executive : The body of persons engaged in the governance or administration of a state. The political executive which is responsible for the governance consists of the head of state, head of government, cabinet etc. In India the President is the head of state for India and the Governor is the head of state for a state. They are called nominal or titular executives or constitutional heads. The Prime Minister and the Chief Ministers are the heads of government and are the real executives for India and the States respectively.

Responsibility of the Cabinet to the Legislature : In the Parliamentary system of government, the cabinet is responsible to the legislature. In India the Union Cabinet is responsible to the Lok Sabha in the Parliament and a State Cabinet is responsible to the State Legislative Assembly. The responsibility is ensured by commanding the confidence of the majority in the appropriate House. Thus if a no-confidence motion is passed against a ministry, or a government-sponsored Bill is defeated it will be assumed that the government has lost the confidence of the House. The Cabinet is not responsible to the Upper House.

Collective Responsibility : The responsibility of the Cabinet in the Parliamentary system is collective. The cabinet has to work as a team. If the Prime Minister or Chief Minister is dissatisfied with another minister, he may ask him to resign or may advise the President or the Governor as the case may be, to dismiss him. If the Lower House expresses no-confidence in a single minister, the entire Ministry has to resign. All the Ministers in a Ministry are expected to support in public, all the decision made by the Ministers singly and collectively.

Question Hour : The time allotted in a Legislature's

daily sitting, for Ministers' answers to the questions, given in writing by the members beforehand. A day's sitting in a House normally starts with the Question Hour.

Zero Hour : The time that follows the Question Hour. For a short period the members are allowed to ask questions regarding the matters already covered during the Question Hour. In practice, the time is used by members to raise sundry matters.

Censure Motion : The motion which seeks to censure the government for its 'lapses'. If the censure motion is passed in the Lower House the Cabinet should resign.

Adjournment Motion : A motion to adjourn the proceedings of the House so that the House may take up, for discussion, some very urgent matter mentioned in that motion. The government does not allow an adjournment motion to be passed.

Cut Motion : A motion which seeks to effect a cut in the demand for grant proposed by the government. If the cut motion is carried out, the Ministry is expected to resign. However, the Finance Minister may accept the plea of the members for reducing the allocation to a department.

Quorum : The minimum number of members who should be present at a sitting of a House in order that it may transact business. If the number of members present falls below the quorum, the presiding officer is expected to adjourn the sitting for some time.

Party Whip : A leader of Legislature Party of a political party who is appointed by the party high command to ensure that the members are present in the House at the right moment. When the whip is issued, the members of a party should vote in the House according to the directive of the party.

Guillotine : The act of putting all the demands for grant to vote, without discussion, on the last day earmarked for the discussions of the budget. Till that time the allocations for certain departments might not have come up for discussion at all.

Defection : Also called floor-crossing or turn-coat. When a member of a Legislature Party quits his party without resigning his seat in the legislature, his act is called defection or floor-crossing. At present there is no law in India which prohibits defection effectively.

Nation-State : A state which consists of one nation only. Nowadays each state is interested in promoting the view that it consists of a single nation only.

Social Contract Theory : The theory advocated by Hobbes, Locke and Rousseau. A theory which seeks to explain the origin of state in terms of social contract.

Divine Rights Theory : A theory of state which holds that the state was created by God who vested all rights in the ruler i.e. Monarch. This theory prevailed in Europe and elsewhere before the Modern Period.

Popular Sovereignty : The sovereignty of a country vested in the people. The idea is that the people are the sovereign in a State.

Political Sovereignty : The sovereignty vested in the political community which wields real power, e.g., the Cabinet in a Parliamentary Democracy. It may also be described as the real sovereign.

Legal Sovereignty : The sovereignty of a state which is legally vested in a particular agency, e.g., the monarch of England, president of India etc. Such persons may be called titular or nominal sovereigns.

Monarchy : A form of Government in which the whole authority is vested in a single person i.e. King, Queen or Emperor. Great Britain, Netherlands, Norway, Sweden etc. have constitutional monarchy, Nepal, Saudi Arabia etc. have absolute monarchy.

Tyranny : A bad or perverted form of Monarchy.

Aristocracy : The rule by the best (a few). When the wealthy few form the government it is called Plutocracy.

Oligarchy : The perverted form of Aristocracy.

Gerantocracy : Rule by the old. Generally applies the tribal communities where elders assemble and take decisions.

Polity : A form of government in which authority is vested in many people collectively. The name originally applied to a Greek City State. Nowadays, we use the term to refer to any political Community.

Mobocracy : A perverted form of Democracy in which mobs or groups of ruffians dominate.

Authoritarianism : A form of Government or attitude in which decisions are made by a single person or coterie of persons at the top, without consulting the ruled.

Totalitarianism : A form of Government or ideology which expects the members of a state to be governed or controlled by the Government in all aspects of life.

Dictatorship : A form of government in which the government is carried on through arbitrary orders (dictates) of the ruling junta. When the ruling junta subscribes to the Communist ideology, it is called Leftist Dictatorship. Others are called Rightist Dictatorship.

People's Democracy : The description used by the Communist Governments to refer to themselves. Such a democracy is different from the normal (liberal) democracy prevailing in the Western countries.

Guided Democracy : A term used by the Indonesian regime of Dr. Sukarno to refer to the form of his government.

Basic Democracy : The description used by the Pakistan military ruler Ayub Khan to refer to the form of his Government. Not a real democracy.

Demagogue : A popular leader in a democracy who appeals to emotions and sentiments of the people and thereby establishes his hold over them.

Parliamentary Form of Government : Also known as Cabinet form. In this form of Democracy the legislature controls the executive. The real power is vested in the Cabinet. The Head of State is nominal executive while the Head of Government (Prime Minister or Chief Minister) is the real executive.

Presidential Form of Government : Also known as Non-Parliamentary form. The real power is vested the President.

who is not responsible to the legislature. Even though there may be a Cabinet, the real executive and nominal executive are one and the same person.

Convention : A meeting of important political persons, either legislators or political leaders, who decide on major issues. The convention system is prevalent in countries like Switzerland and U.S.A. The other meaning of convention is a form of conduct or behaviour or practice that has been going on for a long time in a community or state, be common consent.

Constitution : The supreme law of the land. May be written or unwritten. Takes precedence over and is more important than the ordinary laws.

Separation of Powers : According to the theory of separation of powers, the three wings of the State i.e., the executive, the legislature, and the judiciary should be independent in their own sphere of operation subject to checks and balances, i.e. control and supervision of one wing by the other, to ensure that there is no abuse of authority by each wing.

Distribution of powers : When there are more than one layer of Government as in a federation, the sovereign powers of the State are divided between the Centre and the Units. This distribution of powers may also be called division of powers.

Unitary State : A state in which there is only one layer of Government. Sri Lanka, Great Britain etc. are unitary states.

Federation (Federalism) : A form of Government in which there are more than one layer of Government. Normally two layers, known as Centre and Units (or Provinces or States) exist in a federation. The essential features of a federation are a written constitution, distribution of powers between the Centre and Units; and an independent Judiciary with the power to decide constitutional and legal disputes between the Governments. Federalism is the theory of federal governments. U.S.A., U.S.S.R., Yugoslavia etc., are federal states.

Confederation : League or Union of independent States. The members of a Confederation retain their sovereignty and come under a common control for the performance of certain

function. The right to secede is definite in a Confederation, unlike in a Federation where it is doubtful.

Co-operative Federalism : The scheme of Government that is applicable to a country like India. The Units are given powers in certain spheres, but can exercise them fruitfully only if the Centre and the Units co-operate. Conflicts between the Centre and the Units in such a federation are generally resolved in favour of the Centre.

Autonomy : When a layer of Government or a region in a State is given full powers in certain spheres of activities or certain matters, that layer of Government or region can exercise sovereign authority in the allotted sphere. There should be no intervention or supervision by the Centre or the authority which is granted autonomy initially. Generally such full autonomy does not prevail in practice.

Socialist Democracy : Also known as Socialist Government. Refers to the political system that prevails in countries which have adopted the Marxist or communist ideology.

Legislature : A sovereign body consisting of representatives of the people in a state. The main function of a Legislature is enactment of laws. The other functions include control of the Government budget, both revenue and expenditure; general control over the executive; quasi-judicial functions relating to impeachment of high dignitaries etc. In a parliamentary democracy the legislature controls the executive; but in the Presidential form, the executive is not responsible to the legislature.

Bi-Cameralism : The legislative system in which there are two Houses in the Legislature of the Parliament. The Upper House, generally represents the units in a federation or functional interests or elders or privileged classes. The Lower House generally consists of representatives of the people directly elected and is vested with all financial powers. In general the Lower House is more powerful than the Upper House.

The British Parliament : Consists of two houses, House of Lords and House of Commons.

The U.S. Congress : The Legislature of the U.S.A. Consists of the Senate (Upper House) and the House of Representatives.

Panchayat Raj : Also called Panchayati Raj. A new system of democratic decentralisation introduced in Free India in 1959. May also be considered as a complex system of local self-government in India. The powers and functions of the Panchayat Raj bodies are basically different from those of the civic bodies, which functioned during the British rule in India. In 1957 B.G. Mehta team recommended the setting up of the Panchayat Raj. In 1958 the National Development Council approved of it and the Central Government recommended the establishment of different Panchayat Raj bodies in the States. In 1959, Rajasthan and Andhra Pradesh set up the Panchayat Raj. Soon they were followed by other states. Although the scheme recommended by B G. Mehta report is a three-tier system, only a few states i.e. Maharashtra, Gujarat, Andhra Pradesh, Uttar Pradesh, Bihar, Himachal Pradesh and West Bengal are having all the three tiers. Many states have only a two-tier system. In Jammu & Kashmir, Kerala, Manipur, Tripura and Sikkim we find only the village panchayats. The tribal states of Meghalaya and Nagaland do not have any Panchayat Raj institution. Arunachal Pradesh is the only Union Territory having a three-tier system of Panchayat Raj.

Gram Sabha : This is a general assembly of all the voters residing within the jurisdiction of the village panchayat. In most states the Gram Sabha is either non-existent or functioning with no statutory powers. Where it exists, it is expected to review the working of the Gram Panchayat and to approve the tax proposals for the Panchayats.

Gram Panchayat : The village panchayat is the first tier of the Panchayat Raj. There are 2, 12, 248 village panchayats in India. A Panchayat may cover one or more villages. It is expected to formulate and implement development programmes that are assigned to it by the higher bodies like Panchayat Samiti or Zilla Parishad. It has the power of local taxation. Many panchayats are functioning unsatisfactorily.

owing to want of funds, village feuds, lack of direction and indifference of the members and of the people.

Naya Panchayat : The Judicial Panchayat, considered an adjunct of the Panchayat Raj system. Meant to provide speedy and cheap justice to the villagers. Most Nyaya Panchayats are functioning marginally since the members are generally inactive and ignorant. Besides the State Governments have not shown any interest in training the members of this elementary judicial system

Panchayat Samiti : This second tier of Panchayat Raj system is known by different names in various states. However, the jurisdiction of this body is co-extensive with that of a Community Development Block, which it is expected to supervise. The Taluk-level body is assigned many functions and responsibilities, but does not have enough resources. In many states an organic link between Gram Panchayat and Panchayat Samiti prevails by making the sarpanchas of the village panchayats, the members of the Samiti. Sometimes the members of the Gram Panchayats elect the members of the Panchayat Samiti.

District Panchayat : The top-level tier of Panchayat Raj which is also called Zilla Parishad or District Development Council. In many states this body has advisory role only. Only in Maharashtra, Gujarat and Andhra Pradesh, Zilla Parishad is performing the serious works of district-level planning and execution of development projects. The general tendency is to minimise the role of the district collector in this district-level Panchayat Raj body.

Asoka Mehta Committee on Panchayat Raj : Set up in 1977 and submitted its report to the Government of India in 1978. It has recommended major changes in the Panchayat Raj institutions and constitutional safeguards for their working. Its recommendations regarding a two-tier system with Zilla Parishad and Mandal Panchayats has been taken up for implementation by Andhra Pradesh Government in 1983. The Central Government is still to decide regarding the recommendations of this committee.

Community Development Programme : Started on 2 October, 1952. The U.S. Government and the Ford Foundation aided the Programme in the initial stages. A Community Development Block covers approximately 110 villages and 92,000 people. During the first five years, known as Stage I the Central Government provided Rs. 12 lakhs annually for each block. For the next five years, for Stage II, the allocation for each block was reduced to Rs. 5 lakhs per year. Although it was expected that there would be no scope for development after the completion of Stage II, the blocks have been continuing in all the states. After 1966, the Central Government stopped supplying funds for C.D. programme. At present the Panchayat Samiti, where it exists, is expected to be responsible for the implementation of the C.D. Programme. A total expenditure of more than Rs. 1000 Crores have been allocated to the C.D. Programme in all the six Five-Year Plans. Conceived with the aim of developing the rural community through an integrated network of services, the Programme was initially introduced in selected areas. It was run by officials and was not very successful since popular participation was not there. B.G. Mehta team was appointed in 1956 to recommend measures to improve the working of the C.D. Blocks. After the integration of the C.D. Programme with the Panchayat Raj institution, the working of the blocks improved substantially.

National Extension Service : Started in 1953 with the aim of extending the benefits of Community Development Programme to all the areas in the country. Later NES was integrated into the Community Development Programme. NES provides different specialised services in the fields of agriculture, animal husbandry, education, rural industries, co-operation and medicare to the rural people.

Block Development Officer : The official who is in over-charge of a C.D. Block. He functions according to the advice of the officer-bearer of the Panchayat Samiti.

Extension Officer : An Official of a C.D. Block, in charge of a particular field of development such as education, co-

cooperation or agriculture. He functions under the official supervision of the Block Development Officer.

Gram Sevak : The village-level functionary of the Community Development Block. Appointed by the Block Development Officer, he looks after the development programmes in the village. He is not an employee of the village Panchayat.

Democracy : A form of government and a way of life in the society. Defined as "Government of the people by the people and for the people" by Lincoln. The essence of democracy is periodic popular mandate to the Government. Periodic and fair elections are essential for the successful working of a democratic system. There are many brands of democracy, some real and some bogus.

Direct Democracy : Prevails in a country when all the people (adults) take part in law-making directly. Such a system of government is possible only when the country is very small in size and population. The present-day example of direct democracy is some of the Swiss Cantons.

Representative Democracy : A democracy in which law is enacted by the representatives of the people. All the democratic countries in the world have only Representative Democracy.

Territorial Representation : A form of representation in which the representative is elected by the votes in a territorial constituency. The most popular and practical form of representation. Applies to members of Lok Sabha and of all the State Assemblies.

Single-Member Constituency : The term applies to a constituency from which only one representative is to be elected by the voters. The other system is the system of plural-member constituency in which more than one representative is elected to represent one constituency.

Collective Leadership : The leadership provided by a collective body. This is opposite to individual leadership or hero worship.

Politics : Activities or set of activities relating to decision-making in one sphere of collective human life. Politics may be present in any organisation, institution or establishment. Motives for politics may be power, self-aggrandisement, public service etc. In a narrow sense, politics refers to the set of activities carried on by political parties and groups.

Power Politics : Politics always implies power. However, when a person or group indulges in certain political activities blatantly for the sake of power, the term power politics is used.

Fundamentalism : The ideology which advocates going back to the fundamentals of a religio-political group or community. The term is generally used when certain groups or parties seek mass support by arousing primal sentiments of the people on the basis of religion or culture.

Delegation : The process by which decision-making powers relating to certain matters are passed on to a lower layer of government or hierarchy. The delegating authority retains the right of supervision and of taking away the delegated powers. This delegation is different from decentralisation.

Conclave : A meeting, generally in privacy, of important leaders. Nowadays the term is used with reference to the periodical meetings of opposition leaders in India. Originally the term was evolved in connection with the election of the Pope by Cardinals.

Interest Group : An articulate group in a polity which seeks to promote its interests by lobbying actively in the corridors of power. Trade Unions, Chambers of Commerce, Farmers' Associations etc. are interest groups. Political parties are generally broad-based and seek to promote the interests of various sections of the population. So they are not interest groups but may have special relations with interest groups.

Pressure Groups : Articulate groups which seek to pressurise the government with regard to certain policy matters. All interest groups are pressure groups also.

Public Opinion : Articulated opinion on any issue or matter, voiced loudly by an influential or substantial section of population. Promoted by mass media. Public opinion on any matter may be at variance with the opinion of the Government or of the ruling party.

Propaganda : Modern means of propagating ideologies, opinions or interests. Mass media are freely used for this purpose. Rulers as well as different interest groups resort to propaganda.

2

Constitution of India

PREAMBLE

We, THE PEOPLE OF INDIA, having solemnly resolved to constitute India into a SOVEREIGN SOCIALIST SECULAR DEMOCRATIC REPUBLIC and to secure to all its citizens : JUSTICE, social, economic and political ; LIBERTY of thought, expression, belief, faith and worship ; EQUALITY of status and of opportunity ; and to promote among them all PRATERNITY assuring the dignity of the individual and the unity and integrity of the Nation, IN OUR CONSTITUENT ASSEMBLY this twenty-sixth day of November, 1949. do HEREBY ADOPT, ENACT AND GIVE TO OURSELVES THIS CONSTITUTION.

PART I

THE UNION AND ITS TERRITORY

Article 1 : India is known as Bharat. It is a Union of States.

Article 2 : Admission or establishment of new states.

Article 3 : The Parliament is empowered to alter the area, boundaries or the name of any State. For this purpose the Legislatures of the concerned States will be consulted.

Article 4 : A law made by the Parliament regarding establishment of new States or alteration of area, boundary or name of existing States and other consequential changes will not be deemed as an amendment of the Constitution.

PART II CITIZENSHIP

Article 5 : Citizenship at the commencement of the Constitution.

Article 6 : Deemed citizenship of persons who had migrated from Pakistan and had been registered before 1948.

Article 7 : Rights of citizenship of certain migrants to Pakistan.

Article 8 : Rights of citizenship of certain persons of Indian origin residing abroad on registration.

Article 9 : Indian citizenship of a person will cease if he acquires the citizenship of a foreign State voluntarily.

Article 10 : Continuance of the rights of citizenship in certain cases.

Article 11 : Parliament is empowered to regulate the right of citizenship by law. At present the citizenship Act of 1955 applies. This Act provides for citizenship by birth, descent, registration, naturalisation and by incorporation of territory.

PART III FUNDAMENTAL RIGHTS

Article 12 : The term 'State' in this Part includes the Government of India, Parliament, the State Government, State Legislatures and all local authorities.

Article 13 : The State is prohibited from making any law taking away or abridging the rights conferred by Part III. Any law made in contravention of this Article will be void. However, this restriction will not apply to a constitutional amendment.

Right to equality

Article 14 : Equality before law and equal protection of laws to all persons.

Article 15 : The State is prohibited from discriminating against any citizen on grounds only of religion, race, caste, sex, place of birth or any of them. On the same grounds no citizen will be discriminated against in any public restaurants and other public places. However, special protection to women and children may be extended by the State. Similarly the State may make special provisions the advancement of socially and educationally backward classes of citizens and for the scheduled Castes and scheduled Tribes.

Article 16 : Equality of opportunity in matters of public employment : The State shall not discriminate on grounds only of religion, race, caste, sex, descent, place of birth or residence. However, Parliament may make law prescribing residence with-

in a State as qualification for certain categories of posts in the Central or State Governments. The State may also make reservation of appointments or posts in favour of any backward class of citizens who are not adequately represented in the services.

Article 17 : Abolition of untouchability : practice of untouchability punishable according to law. (The Protection of Civil Rights Act, 1955).

Article 18 : The State is prohibited from conferring any title other than a military or academic distinction. A citizen of India is prohibited from accepting any foreign title. No Government official can accept a foreign title or presents from a foreign State.

Right to freedom

Article 19 : All Indian citizens have the following Six freedoms : (a) freedom of speech and expression subject to reasonable restrictions on the grounds of sovereignty and integrity of India, security of States, friendly relations with foreign States, public order, decency or morality, contempt of court, defamation or incitement to an offence. (b) freedom of assembly, peaceably and without arms subject to reasonable restrictions on the grounds of sovereignty and integrity of India and public order. (c) freedom of association, i.e., form associations or unions subject to reasonable restrictions on the grounds of sovereignty and integrity of India, public order and morality (d) freedom of movement throughout the territory of India subject to reasonable restrictions in the interests of the general public of any Scheduled Tribe (e) freedom of residence and settlement in any part of India subject to reasonable restrictions in the interests of the general public or of any Scheduled Tribes.

(f) freedom of occupation, i.e., the freedom practise any profession, occupation, trade or business subject to reasonable restrictions regarding technical qualifications and monopoly of trade or business.

Article 20 : Certain protections to all persons in respect of conviction and prosecution for offences.

Article 21 : protection of life and personal liberty : No person shall be deprived of his life or personal liberty except according to procedure established by law.

Article 22 : Rights available to all persons in the matter of arrest are to be produced before the nearest Magistrate within 24 hours, to be informed of the ground of arrest and to be defended by a lawyer of his choice. The same Article provides for preventive detention of any person. In the case of preventive detention the protections available are as follows : For detention beyond three months, an Advisory Board should be consulted and should authorize, such detention ; the detenu may be informed of the ground of detention and may be given an opportunity to make a representation ; the maximum period of detention for any class of cases should be prescribed by Parliament by law.

Right against exploitation

Article 23 : Prohibition of traffic in human beings and forced labour.

Article 24 : Prohibition of employment of children below 14 years in any factory, mine or hazardous employment.

Right to freedom of religion

Article 25 : Freedom of conscience and the right to profess, practise and propagate any religion are guaranteed to all persons, subject to public order, morality and health. However, the State may make law regulating the economic, political and other secular activities associated with religious practice. Besides, the State may make law for social welfare and reform, particularly to throw open Hindu religious institutions of a public character to all classes and sections of Hindus. The reference to Hindus in this Article shall be construed as including a reference to persons professing Sikh, Jain or Buddhist religion and the reference Hindu religious institutions shall be construed accordingly. The wearing and carrying of Kirpans shall be deemed to be included in the profession of the Sikh religion.

Article 26 : Every religious denomination shall have the right to establish and maintain religious and charitable institutions and to manage its own affairs in matters of religion subject to public order, morality, health and laws relating to property.

Article 27 : No person shall be compelled to pay taxes, the proceeds of which will be specifically appropriated in payment of expenses for the promotion of any particular religion.

Article 28 : No religious instruction will be imparted in a State educational institution. In other educational institutions receiving State aid religious instruction or worship will not be Compulsary.

Cultural and educational rights

Article 29 : Protection of intersets of minorities : Any section of citizens may take steps to conserve their distinct language, script or culturc. There shall be no discrimination on grounds of religion, race, caste or language in the matter of admission to any educational institution receiving State aid.

Article 30 : All minorities, whether based on religion or language, shall have the right to establish and administer educational institutions of their choice. When the State compulsorily acquires the property of a minority educational institution, due amount of compensation shall be paid. The State shall not discriminate against a minority educational institution in the matter of aid.

Saving of certain laws

Article 31 : This Article regarding compulsory acquisition of property was delcted by the 44 Amendment Act of 1978.

Article 31A : Notwithstanding anything contained in Article 13, no law providing for acquisition of property by the State, or abolition of the managing agency system, or abolition of Zamindari system shall be void.

Article 31B : The Acts and Regulations listed in the Ninth schedule of the Constitution shall not be deemed void on the ground of any inconsistency with any of the Fundamental Rights in this Part.

Article 31C : A law purporting to implement any Directive Principle in Part IV shall not be deemed to be void even if it violates the rights conferred by Article 14 or 19. *No such l-w shall be called in question in any court if it contains a declaration that it is giving effect to such policy,*

Note : In the Kesavananda Bharathi Case, the Supreme Court held that the italics part of this Article was invalid. In the Minerva Mills Case of 1980, the Supreme Court held that the protection given to laws will apply only to Directive

Principles contained in Articles 39B and 39C and will not extend to all Directive Principles.

Article 31D : This Article relating to anti-national associations and activities was inserted by the 42nd Amendment Act of 1976 and was repealed by the 43rd Amendment Act of 1977.

Right to Constitutional Remedies

Article 32 : A person whose Fundamental Right according to this Part is violated may directly move the Supreme Court for the enforcement of his rights. The Supreme Court will have the power to issue any order or writ including the writ of Habeas Corpus, Mandamus, Prohibition, Certiorari and Quo warranto. The right guaranteed by this Article shall not be suspended except as otherwise provided in the Constitution (i.e. during Emergency under Article 352).

Article 33 : The Parliament may modify the application of fundamental rights to the armed forces and the police.

Article 34 : The Parliament may by law indemnify officials who violate the Fundamental Rights in this Part while material law is enforced in any area.

Article 35 : Parliament alone can legislate on certain matters to give effect to some of the provisions of this Part.

PART IV

DIRECTIVE PRINCIPLES OF STATE POLICY

Articles 36-37 : The principles in this Part shall not be justiciable i.e., enforceable in any court; however, they are fundamental in the governance of the country. It shall be the duty of the State to apply these principles in making laws.

Article 38 : The State shall strive to promote the welfare of the people and to secure a just social order. In particular, it will try to minimise the inequalities in income, status, facilities and opportunities.

Article 39 : (a) Right to an adequate means of livelihood for all citizens; (b) the ownership and control of the material resources of the community should be so distributed as to subserve the common good; (c) the operation of the economic system should not result in the concentration of wealth and means of production to the common detriment; (d) and

for equal work for both men and women; (e) steps to protect workers and children.

Article 39A : Equal justice and free legal aid.

Article 40 : The State shall take steps to organise village panchayats and to endow them with such powers as may be necessary to enable them to function as units of self-government.

Article 41 : Right to work; right to education; right to Public assistance in case of unemployment, old age, sickness and disablement.

Article 42 : Provision for just and humane conditions of work and maternity relief.

Article 43 : Living wage for workers; promotion of cottage industries.

Article 43A : Participation of workers in management of industries.

Article 44 : Uniform civil code for all citizens.

Article 45 : Free and compulsory education for children upto 14 years was to be achieved within a period of 10 years from the commencement of the Constitution.

Article 46 : Promotion of educational and economic interests of Scheduled Castes and Scheduled Tribes and other weaker sections. Protection of these persons from social injustice and exploitation.

Article 47 : Duty of the State to rise the level of nutrition and to improve the standard of living and public health of the people; enforcement of Prohibition.

Article 48 : Organisation of agriculture and animal husbandry on modern and scientific lines; prohibition of cow slaughter.

Article 48A : Protection and improvement of environment and safeguarding of forests and wild life.

Article 49 : Protection of monuments and places of historic or artistic importance.

Article 50 : Separation of the judiciary from the executive in the public services.

Article 51 : The State shall endeavour to promote international peace and security; to maintain just and honourable

relations between the nations ; to foster respect for international law and treaty obligations; and to encourage settlement of international disputes by arbitration.

PART IVA FUNDAMENTAL DUTIES

Article 51A : The following shall be the duties of citizens in India; (a) to abide by the Constitution and to respect the Constitution, the National Flag and the National Anthem; (b) to follow the ideals of the national struggle for freedom; (c) to uphold the sovereignty, unity and integrity of India ; (d) to defend the country when necessary; (e) to promote communal harmony and to renounce practices derogatory; (e) to promote communal harmony and to renounce practices derogatory to the dignity of women; (f) to preserve our rich cultural heritage; (g) to protect natural environment and wild life; (h) to develop scientific temper, humanism and spirit of inquiry and reform; (i) to safeguard public property and abjure violence. .

PART V THE UNION

Chapter I – The Executive

The President

Articles 52-53 : The executive power of the Union shall be vested in the President of India and shall be exercised by him either directly or through his officers. The President will be the Supreme Commander of the Defence Forces.

Articles 54-55 : The President shall be elected by an electoral college consisting of the elected members of both Houses of Parliament and the elected members of the Legislative Assemblies of the States, in accordance with the system of proportional representation by means of the single transferable vote by secret ballot. In the allocation of multiple votes to each voter of the electoral college, the following two parities will be maintained. Each M.L.A. of a State should approximately get votes in proportion to the population whom he represents. All the M.L.A.s put together should have the same number of votes as all the M.P.s.

Article 56 : The President's term of office is five years but he will hold the post further till his successor enters

The President may resign, by writing under his hand, addressed to the Vice-President. The Vice-President should communicate the resignation to the Speaker of the House of the People.

Article 57 : A President is eligible for re-election any number of times.

Article 58 : Qualifications for election as President : citizenship of India: above 35 years of age; qualified for election as a member of the House of the People; and should not hold an office of profit.

Article 59 : Conditions of President's Office : The President should not be a member of either House of the Parliament or of any State Legislature; should not hold any other office of profit.

Article 60 : The President should subscribe an oath or solemn affirmation in the presence of the Chief Justice of India or the seniormost judge of the Supreme Court, to preserve, protect and defend the Constitution and the law.

Article 61 : Procedure for impeachment of the President : When the President is to be impeached for violation of the Constitution, either House of the Parliament may initiate proceedings by framing the charge against the President in the form of a resolution after 14 days' notice, signed by not less than one-fourth of the total number of members in that House. The resolution should be passed by a majority of not less than two-thirds of the total membership of the House. Then the resolution will be sent to the other House which will investigate the matter and then may pass the resolution saying that the charge has been proved. The second resolution will have the effect of removing the President from office.

Article 62 : Election to fill the vacancy in the office of the President should be held before the expiration of the normal term of five years or not later than six months from the date of occurrence of vacancy caused by death, resignation or removal of the President.

Vice-President

Articles 63-65 : The Vice-President of India shall be the ex-officio Chairman of the Council of States. When he acts as the President he will perform the duties of the Chairman of the Council of States. When the Vice-President is acting as Presi-

dent, he will have all the powers, functions, remuneration and amenities of the President.

Article 66 : Election of the Vice-President : The Vice-President shall be elected by an electoral college consisting of the members of both Houses of Parliament in accordance with the system of proportional representation by means of the single transferable vote by secret ballot. The Vice-President should not be a member of either of the House of Parliament or of a State Legislature. Qualifications are : citizenship; above 30 years of age; qualified for election as a member of the Council of States.

Articles 67-69 : Other Provisions relating to the Vice-President : Term of Office 5 years; may be removed by a resolution of the Council of States passed by a majority of all the then present members of the Council and agreed to by the House of the people ; the Vice-President should subscribe an oath before the President or some person appointed by him.

Article 70 : The Parliament may make provision for the discharge of the functions of the President in any contingency not envisaged in the Constitution.

Article 71 : Disputes regarding the elections of the President or Vice-President shall be decided by the Supreme Court only.

Article 72 : The President has power to grant pardon, reprieve or remission of sentences in certain cases.

Article 73 : The executive power of the Union shall extend to matters with respect to which the Parliament has power to enact laws.

Article 74 : *Councils of Ministers* : There shall be a Council of Ministers with the Prime Minister at the head, to aid and advise the President who shall, in the exercise of his functions, act in accordance with such advice. The President may require the Council of Ministers to reconsider any advice tendered by it ; after such reconsideration the President has to act according to the advice. The question whether any advice was tendered by the Ministers to the president shall not be inquired into in any Court.

Article 75 : The Prime Minister shall be appointed by the President ; other ministers shall be appointed by the President

on the advice of the Prime Minister. The Ministers shall hold office during the pleasure of the President. The council of Ministers shall be collectively responsible to the House of the People. A Minister should become a member of either House of Parliament within a period of 6 months. The salaries and allowances of the ministers shall be determined by the Parliament by law.

Article 76 : Attorney-General for India : Appointed by the President. Qualifications are the same as for a Judge of the Supreme Court. The duties of the Attorney-General are to advice the Union Government on legal matters, to perform such other functions as are entrusted to him by the Constitution or by the President. He shall hold office during the pleasure of the President, and shall receive such remuneration as may be fixed by the President. He will have the right of audience in all courts in India.

Article 77 : All the executive orders of the Government of India will be in the name of the President.

Article 78 : Duties of the Prime Minister : (a) to communicate to the President all decisions of the Council of Ministers ; (b) to furnish such information as the President may call for ; (c) if the President so requires, to submit for the consideration of the Council of Ministers any matter on which a decision has been taken by a single Minister.

Chapter II Parliament

Article 79 : The Parliament consists of the President, the Council of States and the House of the People.

Article 80 : The Rajya Sabha shall consists of not more than 238 representatives of the States and the Union territories and 12 nominated members who will be nominated by the President for their special knowledge or practical experience in literature, science, art and social service. The representatives from the States will be elected by the elected members of the Legislative Assemblies in accordance with the system of proportional representation by means of the single transferable vote.

Article 81 : The Lok Sabha shall consists of not more than 525 members chosen by direct election from territorial consti-

tuencies in the States, not more than 20 members to represent the Union territories and 2 nominated Anglo-Indian representatives. The allocation of seats in the Lok Sabha to each State will be roughly in proportion to its population. Until the year 2000 A.D. there will be no change in the number of seats allotted to different states.

Article 82 : Delimitation of territorial constituencies for the Lok Sabha election will be done by such authority as may be prescribed by the Parliament by law. (At present Election Commission is the authority prescribed).

Article 83 : The Council of States shall not be subject to dissolution. One-third of the members will retire every second year so that the tenure of a member will normally be 6 years. The House of the People will have a normal duration of 5 years from the date of its first meeting. Only when Emergency is in force the duration of Lok Sabha can be extended by a period not exceeding one year at a time.

Article 84 : Qualifications for membership of Parliament :
(a) Citizenship ; (b) subscribing an oath or affirmation ; (c) 30 years of age for the Rajya Sabha, 25 years for Lok Sabha ; (d) such other qualifications as may be prescribed by law by the Parliament.

Article 85 : The President has the right to summon and prorogue either House of the Parliament and to dissolve the House of the People. The Houses of the Parliament and to dissolve the House of the Parliament should meet so frequently as to ensure that 6 months do not elapse between its last sitting in one session and the first sitting in the next session.

Article 86 : The President may address either House of the Parliament or both Houses assembled together. He may also send messages to either House.

Article 87 : At the commencement of the first session after each General Election to the Lok Sabha and at the commencement of the first session of each year, the President shall address both houses of the Parliament assembled together.

Article 88 : The Union Ministers and Attorney-General of India will have the right to take part in the proceedings of

either House, but will not be entitled to vote unless one is a member of a House.

Article 89 : The Vice-President of India shall be ex-officio Chairman of the Rajya Sabha. A Deputy Chairman will be chosen by the members from among themselves.

Article 90 : The Deputy Chairman may resign his office by writing to the Chairman. He may be removed from his office by resolution of the Council passed by a majority of all the then members after 14 days' notice.

Article 91 : Power of the Deputy Chairman or some other person appointed duly to perform the duties of the office of the Chairman.

Article 92 : The Chairman or the Deputy Chairman not to preside while a resolution for his removal from office is under consideration.

Article 93 : The Lok Sabha will elect the Speaker and the Deputy Speaker from among the members themselves.

Article 94 : The Speaker or Deputy Speaker may resign by writing to each other. Either of them may be removed from office by a resolution passed by a majority of all the then members of the Lok Sabha after 14 days' notice. However, the Speaker shall not vacate his office whenever the Lok Sabha is dissolved. He will continue to hold the office the first meeting of the Lok Sabha after the dissolution.

Article 95 : Power of the Deputy Speaker or some other person duly appointed to perform duties of the Speaker.

Article 96 : The Speaker or the Deputy Speaker not to preside while a resolution for his removal is under consideration.

Article 97 : The Chairman, the Deputy Chairman, the Speaker and the Deputy Speaker shall be paid salaries and allowances as may be fixed by the Parliament by law.

Article 98 : Each House of the Parliament will have a Secretariat.

Article 99 : A member of either House of the Parliament should subscribe an oath or affirmation before taking his seat.

Article 100 : All questions in a regular sitting of either

House or in a joint sitting of the House will be determined by a majority of votes of the members present and voting. The Presiding officer of the House shall not vote in the first instance but may cast his vote in the case of an equality of votes. The Quorum for a meeting of either House will be one/tenth (10%) of the membership of the House until Parliament by law provides otherwise.

Article 101 : Vacation of seats : No person shall be a member of both Houses of Parliament or a member of Parliament and of a State Legislature. If a member of either House of Parliament incurs any disqualification or resigns his seat by writing under his hand addressed to the Chairman or the Speaker, and his resignation is accepted by the Chairman or the Speaker, his seat will become vacant. If a member absents himself from the Parliament for a period of 60 days without permission of the House, the House, may declare his seat vacant.

Article 102 : Disqualifications for memberships : (a) holding an office of profit (b) unsound mind (c) undischarged insolvent (d) acquiring voluntarily the citizenship of a foreign state or acknowledgement of allegiance to a foreign state (e) any other disqualification under law.

Article 103 : All questions of disqualification will be decided by the President after obtaining the opinion of the Election Commission. (The President shall act according to the opinion of the Election Commission).

Article 104 : A person sitting or voting in a House of the Parliament when not qualified or when disqualified will be imposed a penalty of Rs. 500/- per pay.

Article 105 : Powers, privileges and immunities of the Parliament and its members : There shall be absolute freedom of speech in Parliament subject to procedural regulations. No member of Parliament is liable to any proceedings in a court for anything said or any vote given by him. No person shall be liable in respect of the publication, by or under the authority of either House, of the proceedings of the House. In other respects, the powers, privileges and immunities of either House of its members and of the Committees shall be as may be defined by the Parliament by law.

Article 106 : Salaries and allowances of the members of Parliament, may be fixed by law.

Legislative Procedure

Article 107 : A Bill other than a Money Bill or Financial Bill may be introduced in either House of Parliament. A Bill has to be passed by both Houses. A Bill pending in Parliament will not lapse by reason of the prorogation of the Houses.

Article 108 : After a Bill is passed in one House, it will be transmitted to the other House. The second House may reject the Bill or may suggest amendments or may not take any action for a period of 6 months. In any of these cases, after there is final disagreement between the Houses, the President may summon the Houses to meet in a joint sitting for the purpose of voting on the Bill. This procedure will not apply to a Money Bill. The joint sitting will finally vote on the Bill and will decide the matter. If the Bill is passed in the joint sitting it will be deemed to have been passed in both Houses.

Article 109 : Special procedure in respect of Money Bills :
(a) A Money Bill shall not be introduced in the Council of States. After a Money Bill is passed in the Lok Sabha it shall be transmitted to the Rajya Sabha for its recommendation. The Rajya Sabha may make its recommendations within a period of 14 days. The Lok Sabha may either accept or reject the recommendations of the Rajya Sabha and may pass the Bill in the manner it wants. Then the Bill shall be deemed to have been passed by both Houses.

Article 110 : Definition of Money Bill : A Bill which contains provisions dealing with only one or more of the following matters, i.e., imposition abolition or alteration of a tax ; public borrowing by the Government of India ; the custody, use or maintenance of the Consolidated Fund and the Contingency Fund of India ; declaring any expenditure as charged expenditure. It is clarified that imposition of fines, provision of licence fees or levy of local taxes will not make a Bill Money Bill. The question whether a Bill is a Money Bill or not shall be decided by the Speaker whose decision will be final. The Speaker has to endorse each Money Bill before he transmits it to the Council of States.

Article 111 : When a Bill has been passed by both Houses of Parliament it shall be presented to the President who may assent to the Bill, withhold assent or send the Bill back to the Houses with his message. However, he cannot send a Money Bill back to the Houses. After the Houses have reconsidered and passed the Bill again, the President shall assent to the Bill.

Procedure in Financial Matters

Article 112 : Annual financial statement (Budget) : For each financial year the President shall cause to be laid before both Houses of Parliament the 'annual financial statement' showing the estimates of expenditure and of revenue. The following items of expenditure shall be charged on the Consolidated Fund of India : the salaries and allowances of the President, Chairman, Deputy Chairman, Speaker, Deputy Speaker, Judges of the Supreme Court and Comptroller and Auditor-General of India ; debt repayment liability of the Government of India ; Court decrees ; and any other expenditure declared by the Constitution or by law to be charged expenditure.

Article 113 : The Parliament may discuss but not vote on the charged expenditure. The Lok Sabha shall have the power to approve or disapprove of any other expenditure. No demand for a grant shall be made except on the recommendation of the President.

Article 114 : After the Lok Sabha has sanctioned the grants under Article 113, a Bill shall be introduced in the Parliament to provide for the appropriation out of the Consolidated Fund. No amendment shall be proposed to this Appropriation Bill has been passed.

Article 115 : Supplementary, additional or excess grants : The Parliament may sanction supplementary grant when the allocation made for a particular service for the current financial year is found to be insufficient. Additional grant may be sanctioned by the Parliament when a new service not contemplated in the Budget requires expenditure. If money has been spent on any service in excess of the amount granted for that service, the Lok Sabha may sanction excess grant to regularise the excess expenditure.

Article 116 : Vote on account, vote of credit and except-

tional grant; vote on account may be sanctioned by the Lok Sabha when the Government requires any grant in advance before the completion of the procedure for passing the regular Budget. Vote of credit is given to meet unexpected demand or for a service of indefinite character whose details cannot be stated in public. The exceptional grant is made for a service which forms no part of the service during the current financial year.

Article 117 A : Financial Bill which includes other matters than the items relevant for a Money Bill shall not be introduced except on the recommendation of the President and can be introduced only in the Lok Sabha. Such a Bill will have to be passed by both Houses of Parliament.

Article 118 : Each House of Parliament will frame its own rules of procedure. At a joint sitting, the Speaker shall preside.

Article 119 : Regulation of the procedure in Parliament with regard to financial business.

Article 120 : The language to be used in Parliament shall be Hindi or English. However, the Presiding Officer may permit a member to speak in his mother tongue.

Article 121 : No discussion shall take place in Parliament with respect to the conduct of any Judge of the Supreme Court or of a High Court in the discharge of his duties except when proceedings for his removal are taken up.

Article 122 : The Courts shall not look into the validity of any proceedings in Parliament.

Chapter III

LEGISLATIVE POWERS OF THE PRESIDENT

Article 123 : When both Houses of Parliament are not in session, if the President is satisfied of the need for immediate action, he may promulgate an ordinance. An ordinance shall have the same force as an act of Parliament. It should be laid before Parliament and will cease to operate at the expiration of six weeks from the reassembly of the Parliament. If, during this period, both Houses of Parliament pass resolutions disapproving of it, it will cease to operate earlier.

Chapter IV

THE UNION JUDICIARY

Article 124 : The Supreme Court of India shall consist of the Chief Justice and not more than 17 other Judges. The number of Supreme Court Judges is prescribed by law made by Parliament. The President shall appoint each Judge by warrant under his hand and seal after consultation with such Judges of the Supreme Court and of High Courts as he considers necessary. For appointing the other Judges, the Chief Justice of India should be consulted. The age limit for a Judge is 65 years. A Judge may resign by writing to the President. The qualifications prescribed are : citizenship ; a High Court Judge for 5 years in succession or an advocate of a High Court for 10 years in succession or a distinguished jurist in the opinion of the President. A Supreme Court Judge may be removed from his office by an order of the President which may be passed after an address by each House of Parliament to the President for his removal on the ground of proved misbehaviour or incapacity. Such an address should be supported by a majority of the total membership of the House and by a majority of not less than two-thirds of the members of the House present and voting. A retired Judge of the Supreme Court is prohibited from pleading in any Court or before any authority in India.

Article 125 : The salaries, allowances and privileges of a Judge should not be varied to his disadvantage after his appointment.

Article 126 : If the office of the Chief Justice is vacant, a Judge of the Supreme Court may be appointed temporarily as an acting Chief Justice of India.

Article 127 : Appointment of ad hoc Judges : if there is want of quorum in the Supreme Court, the Chief Justice of India may, with the previous consent of the President, appoint a regular Judge of a High Court as an ad hoc Judge of the Supreme Court.

Article 128 : With the previous consent of the President, the Chief Justice of India may request a retired Judge to sit in the Supreme Court with his consent.

Article 129 : Supreme Court is a court of record and has the power to punish for contempt of itself.

Article 130 : The seat of the Supreme Court will be Delhi. But it may also sit in other places with the approval of the President.

Article 131 : Original jurisdiction : the Supreme Court has original jurisdiction in legal disputes between Governments in India.

Article 132 : Appellate jurisdiction in certain cases : If the High Court grants a certificate that a case involves a substantial question of law as to the interpretation of this Constitution, the appeal will lie to the Supreme Court.

Article 133 : Appellate jurisdiction in civil matters : If the High Court certifies that a civil case involves a substantial question of law of general importance to be decided by the High Court the appeal will lie to the Supreme Court.

Article 134 : Appellate jurisdiction in civil matters : An appeal against the judgement of a High Court in a criminal proceedings will lie with the Supreme Court in the case of death sentence, under certain conditions.

Article 134 A : A High Court may grant a certificate if it considers that the case is fit for appeal to the Supreme Court.

Article 135 : Unimportant.

Article 136 : Special leave to appeal : The Supreme Court has the discretion to grant special leave to appeal from any judgment, decree or order passed by any court or tribunal in the territory of India except those relating to armed forces.

Article 137 : Subject to law made by the Parliament, the Supreme Court shall have power to review any of its own judgements.

Article 138 : The Parliament may by law enhance the jurisdiction of the Supreme Court.

Article 139 : The Parliament may confer on the Supreme Court the power to issue orders and writs, including habeas corpus, mandamus, prohibition, quo warranto and certiorari for any purpose other than those mentioned in Article 32.

Article 139 A : When cases involving substantially the same question of law of public importance are pending before the Supreme Court and a High Court or before two or more High

Courts, the Supreme Court may withdraw the cases pending before such other Courts and dispose of them. The Supreme Court may, in order to do justice, transfer a case or proceedings from one High Court to another.

Article 140 : Parliament may by law confer ancillary powers to the Supreme Court.

Article 141 : The law declared by the Supreme Court shall be binding on all courts of India.

Article 142 : Enforcement of decrees and orders of Supreme Court.

Article 143 : Power of the President to consult the Supreme Court : If a question of law or fact of public importance arises, the President may refer the matter for the opinion of the Supreme Court. The Court, after a hearing, may report to the President its opinion. If in any matter of legal dispute between Governments in which the jurisdiction of the Supreme Court is barred by any treaty or agreement, the President may obtain the opinion of the Supreme Court.

Article 144 : All civil and judicial authorities in India shall act in aid of the Supreme Court.

Article 145 : The Supreme Court shall have the power to make rules for its working, subject to the laws made by the Parliament in this regard. The minimum number of Judges to decide an issue involving the interpretation of the Constitution or any presidential reference is five.

Article 146 : The Supreme Court shall appoint its own officers ; the administrative expenses of the Supreme Court shall be charge expenditure.

Article 147 : Unimportant.

Chapter V

COMPTROLLER AND AUDITOR-GENERAL OF INDIA

Article 148 : The Comptroller and Auditor-General is appointed by the President and can be removed only in the manner prescribed for a Supreme Court Judge. The salary and other conditions of service may be prescribed by Parliament by law. He shall be ineligible for further office under any Government.

Article 160 : The President may make provision for the discharge of the functions of the Governor in any contingency not provided in the Constitution.

Article 161 : The Governor shall have power to grant pardon, remission or suspension of sentence of any person convicted under a State law.

Article 162 : The extent of the executive power of a State Government will be coextensive with the power of the Legislature to make laws.

Article 163 : There shall be a Council of Ministers with the Chief Minister as the head to aid and advise the Governor in the exercise of his functions, except in so far as he is under this Constitution, required to exercise his functions in his discretion. If any question arises whether, in any matter, the Governor is to act according to his discretion or according to the advice to the Council of Ministers, his decision will be final. His decision in this matter cannot be questioned in a court of law.

Articles 164-167 : Provisions similar to articles 75 to 78. In the place of Attorney-General for India there will be Advocate-General for the State.

Chapter III

The State Legislature

Article 168 ; For every State there shall be a Legislature consisting of the Governors and one or two Houses. The Lower House in all the States will be known as Legislative Assembly. The Upper House, Legislative Council is there only in the States of Andhra Pradesh, Bihar, Tamil Nadu, Maharashtra, Karnataka and Uttar Pradesh.

Article 169 : Abolition or creation of Legislative Councils : If the Legislative Assembly of a State passes a resolution for creating or abolishing the Council, supported by a majority of the total membership and a majority of not less than two-thirds of the members present and voting, the Parliament may by law provide for the creation or abolition of a Legislative Council. Any law providing for abolition or creation of the Legislative Council shall not be deemed to be an amendment of the Constitution.

Article 170 : The Legislative Assembly of a State shall consist of not more than 500 and not less than 60 members chosen by direct election from territorial constituencies. (Not more than 2 Anglo-Indians may be nominated by the Governor to the Legislative Assembly).

Article 171 : The Legislative Council will have the total number of members not exceeding one-third of the total strength in the Legislative Assembly and not less than 40 members. Nearly one-third of the members in the Council shall be elected by the members of the Legislative Assembly. Nearly one-third of the members will be elected the electorate consisting of members of Municipalities, District Boards and such other local authorities as the Parliament may specify by law. Nearly one-twelfth of the members will be elected by the registered graduates in the State ; another one-twelfth of the members will be elected by the registered teachers. The remainder shall be nominated by the Governor for their special knowledge or practical experience in literature, science, art, co-operative movement and social service.

Article 172 : The Legislative Assembly shall have a normal duration of 5 years. Its life can be extended at the rate of one year at a time during emergency. The Legislative Council is not subject to dissolution but one-third of the members will retire at the end of every second year.

Articles 173-177 : Provisions similar to Articles 84 to 88.

Articles 178-191 : Provisions similar to Articles 89 to 102.

Articles 192 : Questions of disqualification regarding members of the State Legislature shall be decided by the Governor who will decide according to the opinion of the Election Commission in the matter.

Articles 193-195 : Provisions similar to Articles 104 to 106.

Legislative Procedure

Article 196 : Provisions similar to Article 107.

Article 197 : After a Bill is passed by the Legislative Assembly of a State having a Legislative Council, the Bill will

be transmitted to the Council. The Council may reject the Bill or suggest amendments or may not take any action on the Bill for 3 months. In all the above cases, if the Legislative Assembly wants the Bill to be passed either with the amendments suggested or without them, it may pass the Bill for the second time and may again transmit the Bill to the Council. The Council may reject the Bill, or may pass it with amendments or may not take action for a period of one month. In all these later cases the Bill shall be deemed to have been passed by both Houses of Legislature, in the form in which it was passed by the Assembly the second time.

Articles 198-199 : Provisions similar to Articles 109 and 110.

Article 200 : When a Bill has been passed or deemed to have been passed by a Legislative Assembly (in unicameral States) and by both Houses of the Legislature (in bicameral States), it will be presented to the Governor who shall assent to the Bill or withhold assent or send the Bill back to the Houses with his message or may reserve the Bill for the consideration of the President.

Article 201 : When a Bill is reserved for the consideration of the President, the Governor shall send the Bill to him. The President may assent to the Bill or withhold assent or send the Bill back to the Legislature with his message. In the case of a Money Bill of a State, President cannot return the Bill to the Legislature with his message. When a Bill is returned with the message of the President, the Legislature shall reconsider the Bill within six months and may pass it with or without amendments. The Bill shall be again reserved for the consideration of the President.

Articles 202-209 : Provisions similar to those in Articles 112 to 119.

Article 210 : The language to be used in the State Legislature will be the official language of the State or Hindi or English.

Article 211 : The State Legislature shall not discuss the conduct of any Judge of the Supreme Court or of a High Court.

Article 212 : Courts not to inquire into the proceedings of the Legislature.

Chapter IV

Legislative Power of the Governor

Article 213 : Provisions similar to Article 123.

Chapter V

High Courts

Article 214 : Each State shall have a High Court.

Article 215 : High Court is a Court of record and will have powers to punish for contempt of itself.

Article 216 : A High Court shall consists of a Chief Justice and such other Judges as the President may appoint from time to time.

Article 217 : A High Court Judge will be appointed by the President after consultation with the Chief Justice of India, the Governor of the State and the Chief Justice of the State. Age of retirement of a High Court Judge is 62 years. The procedures for removal and resignation of a High Court Judge are similar to those of a Supreme Court Judge. To be appointed a Judge of the High Court, a person should be a citizen of India and should have held a judicial office for 10 years or should have been an Advocate of a High Court in succession for 10 years.

Article 218 : Unimportant.

Article 219 : Oath or affirmation by Judges of High Courts.

Article 220 : A Judge of a High Court is prohibited from pleading before any Court or authority except the Supreme Court and the other High Courts.

Article 221 : The salaries of the Judges will be as specified in the Second Schedule. The allowances and other service conditions will be determined by law by the Parliament.

Article 222 : Transfer of a Judge : The President may, after consultation with the Chief Justice of India, transfer a Judge from one High Court to another. Such a Judge will be entitled to receive compensatory allowance as may be fixed by the President.

Article 223 : Acting Chief Justice : In the case of vacancy or absence of a Chief Justice, any other Judge of the High Court may be appointed by the President to act as Chief Justice,

Article 224 : Additional and Acting Judges : If the President feels that more Judges should be appointed in a High Court because of any temporary increase in the business of the Court, or to clear the arrears of work, he may appoint a duly qualified person as an additional Judge for a period not exceeding two years. In the temporary vacancy of a regular High Court Judge, President may appoint a duly qualified person to act as a Judge during the vacancy. The age limit of sixty-two will apply to Additional and Acting Judges as well.

Article 224 A : Appointment of retired Judges at sittings of High Court.

Article 225 : Jurisdiction of High Courts : The High Court will continue to have all the powers and jurisdiction which it had immediately before the commencement of the Constitution.

Article 226 : Power of the High Courts to issue writs : A High Court may issue any of the conventional writs for an enforcement of Fundamental Rights and for any other purpose.

Article 227 : Power of superintendence : Every High Court shall have superintendence over all courts and tribunals within its territorial jurisdiction.

Article 228 : Transfer of cases : If a High Court is satisfied that a case pending in a subordinate Court involves a substantial question of the law as to the interpretation of the Constitution, it may withdraw the case and may dispose of it or determine the question and may return the case for disposal.

Article 229 : Officers and servants of the High Court are to be appointed by the Chief Justice. The expenses of High Court will be charged on the Consolidated Fund of the State.

Article 230 : The Parliament may by law extend territorial jurisdiction of a High Court to cover any Union territory.

Article 231 : The Parliament may by law establish a common High Court for two or more States or for two or more States and Union territories.

Article 232 : Deleted.

Chapter VI

Subordinate Courts.

Article 233 : The Governor of a State shall appoint the District Judges in consultation with the High Court.

Article 233 A : Unimportant.

Article 234-237 : Unimportant.

PART VII (Article 238 Repealed)

PART VIII

THE UNION TERRITORIES

Article 239 : A Union territory shall be administered by the President acting through an administrator.

Article 239 A : Parliament may by law create a Council of Ministers and a Legislature for Goa, Daman and Diu ; Pondicherry ; Mizoram ; and Arunachal Pradesh. The members of the Legislature will be partly nominated and partly elected.

Article 239 B : The administrator of a Union territory may promulgate ordinance during the recess of Legislature after obtaining instructions from the President. However, he shall not promulgate any ordinance during the period of dissolution or suspension of the Legislature.

Article 240 : The President may make regulations for the Union Territories of Andaman & Nicobar Islands; Lakshadweep; Dadra & Nagar Haveli; Goa, Daman and Diu; Pondicherry; Mizoram; and Arunachal Pradesh. Any such regulation will have the same force as an Act of Parliament.

Article 241 : Parliament may constitute a separate High Court for a Union territory or may declare any court in such territory to be a High Court for the purposes of the Constitution.

Article 242 : Repealed.

PART IX (Repealed)

PART X

THE SCHEDULED AND TRIBAL AREAS

Article 244 : The Fifth Schedule of the Constitution shall apply to the administration of Scheduled Areas and Scheduled Tribes in any State other than Assam and Meghalaya. The Sixth Schedule shall apply to the administration of tribal areas in Assam, Meghalaya and Mizoram.

Article 244-A : Formation of an autonomous State comprising certain tribal areas in Assam and creation of a Legislature or Council of Ministers.

PART XI

RELATIONS BETWEEN THE UNION AND THE STATES

Chapter I

Legislative Relations

Article 245 : Parliament may make laws for the whole or any part of India; the Legislature of a State may make laws for the whole or any part of the State.

Article 246 : Parliament has the exclusive power to make laws on any matter in List I (Union List in the Seventh Schedule). The Legislature of a State has exclusive power to make laws on any matter in List II (State List in the Seventh Schedule), subject to certain conditions. The Parliament and the State Legislature have power to make laws on any matter in List III (Concurrent List in the Seventh Schedule). Parliament also has power to make laws on any State subject for the Union territories and outside territories.

Article 247 : Parliament may, by law, provide for establishment of additional Courts, for better administration of laws made by it.

Article 248 : Residuary powers of legislation : The Parliament has exclusive power to make laws on any matter not enumerated in the Concurrent List or State List.

Article 249 : Power of the Parliament to legislate on a State subject in national interest. If the Rajya Sabha passes a resolution supported by not less than two-thirds of the members

present and voting that it is necessary in the national interest for the Parliament to enact law on a State subject, the Parliament may make law on that subject. A resolution made by the Rajya Sabha shall remain in force for a period not exceeding one year. The law made by the Parliament on the State subject shall cease to have effect at the expiration of six months from the one year period mentioned above.

Article 250 : The Parliament may enact law on a matter in the State List when a Proclamation of Emergency is in operation. Any such law will cease to be effective six months after the Emergency is over.

Article 251 : In the case of inconsistency between laws made by Parliament and laws made by the State Legislature on a State subject, the Parliamentary law shall prevail.

Article 252 : Power of the Parliament to legislate on a State subject with consent of the States : If two or more States want the Parliament to enact a law on a State subject, common to them, the Parliament may do so.

Article 253 : The Parliament may enact law on a State subject for implementing any treaty or agreement with any other country or to implement a decision made at an international conference.

Article 254 : In case of inconsistency between a Parliamentary law and a State law on any matter in the Concurrent List the central law will prevail; unless the State law having a provision repugnant to a provision of the Central law, has been reserved for the consideration of the President and has received his assent.

Article 255 : Requirements as to recommendations and previous sanctions to be regarded as matters of procedure only.

Chapter II

Administrative Relations

Article 256 : The executive power of a State shall be so exercised as to ensure compliance with a Union law; for this purpose the Central Government may issue direction to a State.

Article 257 : The executive power of a State shall be so exercised as not to impede the executive power of the Union.

Besides, the Union may issue directions to a State regarding construction and maintenance of means of communication of national or military importance and regarding measures to be taken for the protection of railways. Regarding expenditure in this connection, the State Government and the Central Government may agree mutually or may refer the matter to the Chief Justice of India as arbitrator.

Article 258 : The President may, with the consent of a State Government, entrust a Central Government's function to an officer of the State Government.

Article 258 A : The Governor of a State may, with the consent of the Government of India, entrust to the Union Government's officers certain functions of the State Government.

Article 259 : Repealed.

Article 260 : The Union Government will have exclusive jurisdiction in relation to territories outside India.

Article 261 : All public acts, records and judicial proceedings of the Union and of every State will be given full faith and credit throughout India.

Article 262 : Disputes relating to waters : Parliament may by law provide for adjudication of any dispute regarding the Inter-State rivers or river valleys. No court shall have jurisdiction in these matters.

Article 263 : Inter-State Council : The President may appoint an Inter-State Council in public interest. The duties of such a Council will be to inquire into and advise on disputes between the States, to investigate matters of common interest for two or more States, and to make recommendations regarding co-ordination of policy and action on any subject.

PART XII

FINANCE, PROPERTY, CONTRACTS AND SUITS

Article 264 : Unimportant.

Article 265 : No tax shall be levied or collected except by authority of law.

Article 266 : Consolidated Fund of India, Consolidated Fund of each State, Public Account of India and Public

Account of each State : No money out of any Consolidated Fund shall be appropriated except in accordance with law and for the purposes provided in the Constitution.

Article 267 : Contingency Fund : The fund will be at the disposal of the President or the Governor, as the case may be, and will be used by him to meet unforeseen expenditure pending authorisation by the Parliament or the Legislature respectively.

Distribution of Revenues between the Union and the States

Article 268 : Duties levied by the Union but collected and appropriated by the States e.g. stamp duties, Excise duties on medicinal and toilet preparations.

Article 269 : Taxes levied and collected by the Union but assigned to the States e.g. succession duties, estate duty, terminal taxes, tax on railway fares and freights, tax on sale or purchase of newspapers. The net proceeds of any such tax or duty shall be distributed among the States according to principles formulated by Parliament by law.

Article 270 : Tax on income other than agricultural income shall be levied and collected by the Union but shall be distributed between the Union and the States as per prescribed percentage.

Article 271 : The Parliament may levy a surcharge exclusively for the Union on certain duties and taxes mentioned in Articles 269 and 270.

Article 272 : Duties of excise on items other than medicinal and toilet preparations shall be levied and collected by the Union but a part of the collection may be distributed to the States according to law passed by the Parliament.

Article 273 : Unimportant.

Article 274 : Unimportant.

Article 275 : Grants from the Union to certain States : The Union may provide by way of assistance different sums of money to different States, including costs of schemes of development for the purpose of promoting the welfare of Scheduled tribes and scheduled areas.

Article 276 : The State Legislature may enact law providing for taxes on professions, trades and employment. The maxi-

imum amount of such tax for any person in a State should not exceed Rs. 250/- per annum.

Article 277 : Unimportant.

Article 278 : Deleted.

Article 279 : The method of calculation of 'net proceeds'.

Article 280 : Finance Commission : The President may appoint a Finance Commission every fifth year. The Commission shall consist of a Chairman and four other members whose qualifications will be determined by the Parliament by law. The duties of the Commission are to make recommendations to the President regarding the distribution between the Union and the States of the net proceeds of the taxes, the principles which should govern grants-in-aid and any other matter referred to the Commission by the President.

Article 281 : The report of a Finance Commission shall be laid before the Parliament.

Article 282 : Unimportant.

Article 283 : Custody of the Consolidated Fund, the Contingency Fund and the Public Account.

Article 284 : Unimportant.

Article 285 : The property of the Union will be exempt from the State taxes.

Article 286 : Restrictions on State laws regarding imposition of tax on the sale or purchase of goods outside the State or for export.

Article 287 : Exemption from taxes on electricity.

Article 288 : Unimportant.

Article 289 : The property and income of a State shall be exempt from Union taxation.

Article 290-290 A : Unimportant.

Article : 291 : Relating to abolition of Privy Purses.

Article 292 : Borrowing by the Government of India.

Article 293 : Borrowing by State Governments.

Article 294-296 : Unimportant.

Article 297 : Things of value within the territorial waters or Continental Shelf and resources of the Exclusive Economic Zone are to vest in the Union.

Article 298 : Power of Governments to carry on trade.

Article 299 : Contracts of the Government.

Article 300 : Suits and proceedings by or against the Government.

Article 300 A : Right to property : no person shall be deprived of his property except by authority of law.

PART XIII

TRADE, COMMERCE AND INTERCOURSE WITHIN THE TERRITORY OF INDIA

Article 301 : There shall be freedom of trade, commerce and intercourse throughout India.

Article 302 : Parliament may by law impose restriction on any inter-State commerce or trade.

Article 303-307 : Certain restrictions on the legislative powers of the Unions and the States with regard to trade and commerce.

PART XIV

SERVICES UNDER THE UNION AND THE STATES

Chapter I Services

Article 308 : This Part generally does not apply to Jammu and Kashmir.

Article 309 : Recruitment and conditions of service of persons serving the Union or a State.

Article 310 : Every person who is a member of a defence service or of a civil service of the Union or of an All-India Service or holds any defence or civil post under the Union holds office during the pleasure of the President. Every person who is a member of civil service of state or holds any civil post under a state holds office during the pleasure of the Governor.

Article 311 : A person who is a member of a Union civil service or of an All-India Service or of a State civil service or holds a civil post under the Union or a State has the following protections : he shall not be dismissed or removed by an authority subordinate to the appointing authority. Before dismissal, removal or reduction in rank of such a person, an enquiry should be held against him on specific charges and he

should be given a reasonable opportunity of being heard. This protection will not however apply in the case of a person who has been convicted on a criminal charge or in those cases when the authority holds that it is not reasonably practicable to hold an enquiry or in case the President or the Governor is satisfied that in the interests of the security of the State, it is not expedient to hold such an enquiry.

Article 312 : All-India services : if the Council of States declares by a resolution supported by not less than two-thirds of the members present and voting that it is necessary in the national interest to create one or more All-India Services, the Parliament may by law do so. The Constitution mentions only two All-India Services i.e. I.A.S. and I.P.S. (The third at present is Indian Forest Service).

Article 312 A : Power of Parliament to change conditions of service of I.C.S. and other officers.

Article 313 : Unimportant.

Article 314 : Repealed.

Chapter II-Public Service Commissions

Article 315 : There shall be a Union Public Service Commission and a Public Service Commission for each State. However, two or more states may agree for the creation of a joint State Public Service Commission to be created by law by the Parliament.

Article 316 : The Chairman and members of Union Public Service Commission will be appointed by the President. The Chairman and members of a State Commission will be appointed by the Governor. The tenure of a member of a Public Service Commission will be six years, subject to the maximum age limit of 65 for the U.P.S.C. and 62 for the State Commission. A member may resign by writing to the President or the Governor as the case may be. No member of a Public Service Commission will be eligible for reappointment to the same post.

Article 317. A member of any Public Service Commission may be removed by the President if he is adjudged as an insolvent or engages in any paid employment outside his or

is unfit to continue in office by reason of infirmity of mind or body. Except in the above cases a member or Chairman of a Commission can be removed from office only by the order of the President on the ground of misbehaviour after the Supreme Court, reference being made to it by the President, holds an inquiry and recommends his removal.

Article 318 : The President or the Governor shall have power to make regulations regarding service conditions of members and the staff of the Commission.

Article 319 : Prohibition regarding holding of office by members of the Commission on ceasing to be such members : The Chairman of U.P.S.C. shall be ineligible for further employment under any Government. The Chairman of a State Public Service Commission shall be ineligible for any employment except as the Chairman or member of the U.P.S.C. or as the Chairman of any other State Public Service Commission :

Article 320 : Functions of public Service Commissions : to conduct examinations for appointment to the services of the Union and of the States respectively ; to be consulted by Governments on matters relating to methods of recruitment, promotions, transfers and disciplinary actions against Government servants.

Article 321 : Unimportant.

Article 322 : Expenses of all Public Service Commissions to be charged to the Consolidated Fund of India or of the State, as the case may be.

Article 323 : Reports of Public Service Commissions shall be presented to the President or the Governor as the case may be, and will be laid before each House of Parliament and before the State Legislature respectively.

PART XIV A TRIBUNALS

Article 323 A : Administrative Tribunals : Parliament may by law provide for administrative tribunals to hear disputes and complaints regarding Union, State or local Government employees. Public sector undertakings also may be covered by this tribunals.

Article 323 B : Tribunals for other matters : The appropriate legislature may by law provide for tribunals to decide disputes, complaints or offences relating to matters such as taxes, foreign exchange, industrial and labour disputes, land reforms, ceiling on Urban property, elections, food procurement and distribution and other matters.

PART XV ELECTIONS

Article 324 : Election Commission : The superintendence, direction and control of the preparation of electoral rolls and the conduct of elections shall be vested in the Election Commission. The Commission will be responsible for the elections to the Parliament and State Legislatures and to the offices of President and Vice-President. The Commission shall consist of a Chief Election Commissioner and such other Election Commissioners as may be appointed by the President. There is a provision for appointing Regional Commissioner also. The Commission will make use of the staff of the Union and of the States for the discharge of its functions.

Article 325 : In India there shall be one general electoral roll. No person shall be discriminated against in the matter of inclusion in the electoral roll, on grounds only of religion, race, caste or sex.

Article 326 : Elections to the Lok Sabha and to the State Assemblies are to be on the basis of adult suffrages. A person of 21 years of age, when not disqualified on the ground of non-residence, unsoundness of mind, crime, corrupt or illegal practice, shall be entitled to be a voter.

Article 327 : Power of the Parliament to make provisions regarding elections to all legislatures in India.

Article 328 : Power of the Legislature of a State to make provisions regarding elections to the Legislature of the State subject to the provision of Article 327.

Article 329 : Elections to the Parliament or to a State Legislature shall not be called in question in a Court of law, except in the manner provided by law made by the appropriate Legislature.

PART XVI

SPECIAL PROVISIONS RELATING TO CERTAIN CLASSES

Article 330 : Seats shall be reserved in the Lok Sabha for Scheduled Castes and Scheduled Tribes (except in the tribal areas of Assam, in Nagaland, Meghalaya, Arunachal Pradesh and in Mizoram). (At present the number of reserved seats is 78 and 30 respectively).

Article 331 : The President may appoint two Anglo-Indians to represent their community in the House of the people.

Article 332 : There shall be reservation of seats for Scheduled Castes and Scheduled Tribes in the Legislative Assembly of each State except in Nagaland and Meghalaya. The number of seats reserved for the Scheduled Castes and Tribes will be roughly in proportion to their population to the total population of the State.

Article 333 : The Governor of a State may give representation to the Anglo-Indian Community by nominating not more than one member to the Assembly.

Article 334 : Reservation of seats for Scheduled Castes and Scheduled Tribes and special representation for the Anglo-Indian community shall cease after a period of 40 years from the commencement of the Constitution.

Article 335 : The claims of the members of Scheduled Castes and Scheduled Tribes shall be taken into account, consistent with the maintenance of the efficiency of administration, in making appointments to services and posts in Union and State Governments.

Articles 336-337-Unimportant.

Article 338 : A Special Officer for Scheduled Castes and Tribes shall be appointed by the President. His duty will be to investigate all matters relating to safeguards provided for Scheduled Castes and Tribes and to report to the President regarding further safeguards.

Article 339 : Control of the Union over the administration of Scheduled areas and welfare of Scheduled Tribes : The

President may appoint a Commission to report on this matter. The executive power of the Union shall extend to giving of directions to State Governments regarding schemes for the welfare of Scheduled Tribes in that State.

Article 340 : Backward Classes Commission : The President may appoint a Commission to investigate the conditions of socially and educationally backward classes and to make recommendations to improve their conditions. The President shall cause to lay before the Houses of Parliament the copy of the report of the Commission along with a memorandum, explaining the action proposed to be taken.

Article 341 : The President to publish the list of Scheduled Castes.

Article 342 : The President to publish the list of Scheduled Tribes.

PART XVII OFFICIAL LANGUAGE

Article 343 : The official language of the Union is Hindi in Devanagari script. The numerals to be used for Union official purposes will be the international form of Indian numerals. However, for the period of fifteen years from the commencement of the Constitution, English will be used for all official purposes. Besides Parliament may by law provide for the use of the English language, or Devanagari form of numerals even after a period of fifteen years.

Article 344 : At the end of five years from the commencement of the Constitution, the President shall appoint a Commission to make recommendations regarding progressive use of Hindi for Union official purposes and restrictions on the use of English. The Commission will take into account the just claims and interests of the non-Hindi speaking people regarding public services.

Article 345 : The Legislature of a State may adopt any one or more of the languages in use in the State or Hindi as the language to be used for official purposes of the State. However, English shall continue to be used until the State Legislature provides otherwise.

Article 346 : Official language for communication between one State and another or between a State and the Union shall be the Union official language.

Article 347 : If the president is satisfied that a substantial proportion of the population of a State desire the use of any language spoken by them to be recognised by that State, he may direct that such language shall also be officially recognised in that state.

Article 348 : Until the Parliament by law provides otherwise all proceedings in the Supreme Court and in every High Court and the authoritative texts of all Bills and accounts shall be in English. However, the Governor of a State may, with the consent of the President, authorize the use of Hindi or any other language for proceedings in the High Court.

Article 349 : Unimportant.

Article 350 : Every person shall be entitled to submit a representation for the redress of any grievance to an officer of the Union or of a State in any language used in the Union or in the State.

Article 350 A : The President may issue instructions to a State regarding provision of facilities for instructions in mother-tongue at the Primary stage of education.

Article 350 B : A Special Officer for linguistic minorities shall be appointed by the President. It shall be the duty of the Special Officer to investigate all matters relating to the safeguards for linguistic minorities and to make recommendations. The President may cause to lay all such reports before the Parliament or the appropriate State Legislature.

Article 351 : It shall be the duty of the Union to promote the spreading of Hindi and its enrichment.

PART XVIII EMERGENCY PROVISIONS

Article 352 : If the President is satisfied that a grave emergency exists threatening the security of India or any part of it by war, external aggression or armed rebellion, he may issue a proclamation of Emergency. Such a proclamation may be

issued even before the actual occurrence if the president is satisfied of the imminent danger of it. A proclamation may be revoked by a subsequent proclamation. Emergency may be proclaimed for the whole of India or for a part. Different proclamations may be issued on different grounds for simultaneous operation.

For issuing the proclamation, the president should get the decision of the Union Cabinet in writing. Every proclamation shall be laid before each House of parliament and shall cease to operate at the expiry of one month unless before that period it has been approved by resolutions of both Houses of parliament. The proclamation approved by the parliament shall cease to operate on the expiration of six months, provided that if a resolution approving the continuance of such a proclamation is passed by parliament, it may continue for a further period of six months. Thus the Proclamation of Emergency may be extended at the rate of six months at a time. A resolution supporting the proclamation is to be passed by a majority of the total membership of a House and by a majority of not less than two-thirds of the members of that House present and voting. A proclamation of Emergency should be revoked by the President if the Lok Sabha passes a resolution disapproving of it. For the purpose of disapproving the continuance of Emergency, a 14-day notice in writing signed by not less than one-tenth of the total number of members in the Lok Sabha may be given for requisitioning a special sitting of the House.

Article 353 : Effect of Proclamation of Emergency : While Emergency is in force the executive power of the Union will extend to the giving directions to the State Government regarding the exercise of the executive power of the latter. The Parliament will have power to make laws on any matter in the State List.

Article 354 : While Emergency is in force the President may, by order, change any provision of Articles 268 to 279, relating to distribution of revenues between the Central and State Governments.

Article 355 : It is the duty of the Union to protect every State against external aggression and internal disturbance and

to ensure that the Government of a State is carried on in accordance with the provisions of the Constitution.

Article 356 : (President's Rule) : If the President, on receipt of a report from the Governor or otherwise, is satisfied that a situation has arisen in which the Government of a State cannot be carried on in accordance with the provisions of the constitutions, the President may issue a Proclamation. In that Proclamation he may assume to himself all the powers vested in the Governor, the Government of the State or any other body or authority other than the legislature or the High Court. He may declare that the powers of the State legislature shall be exercised under the authority of Parliament. Any such proclamation may be revoked by a subsequent proclamation.

Every such proclamation should be laid before each House of Parliament and should cease to operate at the expiration of two months unless each House of Parliament approves of it by resolutions. Even after such approval, a Proclamation shall cease to operate on the expiration of six months from the date of issue of the proclamation. The President's rule may be imposed for six months in the first instance and may be continued for another six months only. Beyond the period of one year from the date of issue of such proclamation, the President's rule shall not be continued unless a Proclamation of Emergency under Article 352 is in force and the Election Commission certifies that there are difficulties in holding elections to the Legislative Assembly of the State. However, the maximum period of President's rule cannot go beyond three years in any case. (Note : The constitution does not use the term 'President's rule'.)

Article 357 : The Parliament may confer on the President the powers of the State Legislature to make laws and may authorize the President to delegate such powers to any other authority. President may authorize expenditure from the Consolidated Fund of the State, if the house of the people is not in session.

Article 358 : While a Proclamation of Emergency under Art. 352 is in force on the ground of war or external aggression, the provisions of Art. 19 will be automatically suspended.

Article 359 : While a Proclamation of Emergency is in force, the President may, by order, declare that the right of a person to move any court for enforcement of the rights in Part III (except Articles 20 and 21) will be suspended for the period of Emergency. However, the same rights may be enforced through the courts after the Emergency is over.

Article 360 : Financial Emergency : If the financial stability or credit of India is threatened, the President may issue a proclamation to that effect. Such a proclamation will cease to be operative after a period of two months unless it is approved by both Houses of Parliament. During the financial Emergency, the executive power of the union will extend to the giving of directions to any State to observe canons of financial propriety and to reduce salaries and allowances of all Constitutional functionaries and officials. There is no time limit for Financial Emergency ; it will continue till the President revokes it.

PART XIX MISCELLANEOUS

Article 361 : Protection of President and Governors : They are not answerable to any court for the performance of their duties. No criminal proceeding can be filed against them during their term of office. They cannot be arrested or imprisoned during the term of office. Civil proceedings against any of them can be instituted only after a two-months notice.

Article 361 A : No person shall be liable for any proceeding in court for the publication, in a newspaper, of a substantially true report of the proceedings of any House of the Parliament or of a State Legislature. The same protection is available to broadcasting also.

Article 363 : Bar to interference by courts in disputes arising out of certain treaties, agreements etc.

Article 366 A : Derecognition of the Rulers of the Indian States and the abolition of their privy purses.

Article 364 : The Parliament is empowered to enact laws applicable to major ports and aerodromes.

Article 365 : When a State fails to comply with the direc-

tions given by the Union Government, it shall be the lawful for the President to assume that a situation has arisen in which the Government of the State cannot be carried on in accordance with the provisions of the Constitution.

Article 366 : Definitions of various terms.

Article 367 : Unimportant.

PART XX AMENDMENT OF THE CONSTITUTION

Article 368 : Power of Parliament to amend the Constitution and the procedure : The Parliament may, in exercise of its constituent power amend by way of addition, variation or repeal any provision of this Constitution in accordance with the procedure laid down in this Article. A Bill for Constitutional amendment may be introduced in either House of Parliament After the Bill is passed in each House by a majority of the total membership of that House and by majority of not less than two-thirds of the members of the House present and voting, it shall be presented to the President who shall assent to the Bill.

Any amendment to the following provisions of the constitution will have to be ratified by the legislatures of not less than one-half of the States ; only after such ratification the Bill shall be presented to the President for his assent :

- (a) Articles 54, 55, 73, 162 and 241
- (b) Chapter IV of Part V dealing with the Supreme Courts ;
Chapter V of Part VI dealing with the High Courts ;
Chapter I of Part XI dealing with the legislative relations between the Centre and the States
- (c) any of the Lists in the Seventh Schedule
- (d) the representation of States in Parliament
- (e) Article 368 itself.

Nothing in Article 13 shall apply to any Constitutional amendment. (The Supreme Court, in the *Minerva Mills Case*, has struck down as an unconstitutional clauses 4 and 5 of this

Article which provide that no Constitutional amendment shall be called in question in any court on any ground and that there shall be no limitation whatever on the power of the Parliament to amend the Constitution.)

PART XXI

TEMPORARY, TRANSITIONAL AND SPECIAL PROVISIONS

Article 369 : Unimportant.

Article 370 : Temporary provisions relating to Jammu and Kashmir : The provisions of article 238 shall not apply in relation to Jammu and Kashmir. The power of Parliament to make laws for that States shall be limited to those matters in the Union List and the Concurrent List which are listed in the Instrument of Accession and such other matters in the said Lists as the President may specify with the concurrence of the Government of that State. However, the President may issue a public notification stating that this Article shall cease to be operative or will be operative only with certain modifications from any specified date. But the recommendation of the Constituent Assembly of the State shall be necessary before the President issues such notification. At present, Constitution (Application to Jammu and Kashmir) Order, 1954 of the President specifies in detail which provisions of the Constitutions will be applicable with what modifications to that State.

Article 371 : Special provisions relating to Maharashtra and Gujarat : The President may order the establishment of separate development boards for Vidarbha, Marathwada, the rest of Maharashtra, Saurashtra, Kutch and the rest of Gujarat.

Article 371 A : Special provisions regarding Nagaland.

Article 371 B : Special provisions regarding Assam.

Article 371 C : Special provisions regarding Manipur.

Article 371 D : Special provisions regarding Andhra Pradesh.

Article 371 E : Parliament may by law provide for the establishment of a University in the State of Andhra Pradesh.

Article 371 F : Special provisions regarding Sikkim.

Article 372 : Continuance in force of existing laws and their adaptation.

Article 372 A : Power of the President to adapt laws.

Article 373 : Power of the President to make order in respect of persons under preventive detention in certain cases.

Article 374 : Unimportant.

Article 375 : Courts, authorities and officers in India to continue to function subject to the provisions of the Constitution.

Article 376-378 : A Unimportant.

Articles 379-391 : Repealed.

Article 392 : Power of the President to remove difficulties.

PART XXII

SHORT TITLE, COMMENCEMENT AND REPEALS

Article 393 : This Constitution may be called the Constitution of India.

Article 394 : Commencement : Some of the Articles will come into force at once and the remaining Articles shall come into force on 26 January 1950, which day is referred to in this Constitution as the commencement of the Constitution.

Article 395 : The Indian Independence Act 1947; the Government of India Act 1935, etc. are repealed.

FIRST SCHEDULE

The territorial extent of the twenty-two States and nine Union territories are prescribed.

SECOND SCHEDULE

This Schedule lists provisions relating to the emoluments, allowances and service conditions of the President, Governors of States, Speaker and Deputy Speaker, Chairman and Deputy Chairman, Judges of the Supreme Court, Judges of the High Court and the Comptroller and Auditor-General of India. The emoluments prescribed by the constitution for the important Constitutional functionaries are as follows :

President	Rs. 10,000
Governor of a State	Rs. 5,500
Chief Justice of India	Rs. 5,000
Judge of the Supreme Court	Rs. 4,000
Chief Justice of a High Court	Rs. 4,000
Judge of a High Court	Rs. 3,500
The Comptroller and Auditor-General of India	Rs. 4,000

The emoluments of the Vice-President (Chairman of the Council of States), Speaker of the House of the People, Deputy Speaker, and Deputy Chairman of the Parliament, Speaker, Deputy Speaker, Chairman and Deputy Chairman of the State Legislatures are not specified in the Constitution. Their salaries and allowances will be governed by the laws passed by the Parliament and the State Legislature respectively.

THIRD SCHEDULE

Forms of Oath of Affirmations for different Constitutional functionaries, i.e., Union Ministers, members of Parliament, Judges of Supreme Court, Comptroller and Auditor-General of India, State Ministers, members of State Legislature, Judges of High Courts and candidates for election to the Parliament or to State Legislatures are prescribed. For Ministers, in addition to the oath of office, there is an oath of secrecy also.

FOURTH SCHEDULE

Allocation of seats in the Council of States

(As at present)

1. Andhra Pradesh	18
2. Assam	7
3. Bihar	22
4. Gujarat	11
5. Haryana	5
6. Kerala	9
7. Madhya Pradesh	16
8. Tamil Nadu	18
9. Maharashtra	19
10. Karnataka	12
11. Orissa	10

12. Punjab	7
13. Rajasthan	10
14. Uttar Pradesh	34
15. West Bengal	16
16. Jammu and Kashmir	4
17. Nagaland	1
18. Himachal Pradesh	3
19. Manipur	1
20. Tripura	1
21. Meghalaya	1
22. Sikkim	1
23. Delhi	3
24. Pondicherry	1
25. Mizoram	1
26. Arunachal Pradesh	1

Total

232

FIFTH SCHEDULE

Provision related to the Administration and Control of Scheduled Areas and Scheduled Tribes

The President is empowered to declare an area as Scheduled Area. The Union Government may issue directions to State Governments regarding the administration of Scheduled Areas.

SIXTH SCHEDULE

Provisions relation to the Administration of Tribal Areas (In the States of Assam and Meghalaya and in the Union territory of Mizoram)

An autonomous district will have a District Council which will have legislative powers subject to the over-all control of the Governor. It may also be vested with the powers of a court of appeal and will have power to establish primary schools, to collect land revenue and to impose taxes. It may grant licences of lease for prospecting of minerals and may regulate money-lending and trading by non-tribals within the district. If there are different Schedule Tribes in an auton-

SEVENTH SCHEDULE

List III-Concurrent List : Criminal procedure and criminal law, preventive detention, contract, marriage, trusts, civil procedure, forests, planning, family planning, trade unions, education, minor ports, shipping, price control, factories, electricity, newspapers.

EIGHTH SCHEDULE

Languages : 1. Assamese, 2. Bengali, 3. Gujarati, 4. Hindi, 5. Kannada, 6. Kashmiri, 7. Malayalam, 8. Marathi, 9. Odia, 10. Punjabi, 11. Sanskrit, 12. Sindhi, 13. Tamil, 14. Telugu, 15. Urdu.

10. Punjabi, 11. Sanskrit, 12. Sindhi, 13. Tamil, 14. Telugu, 15. Urdu.

NINTH SCHEDULE

188 items of laws and regulations are listed.

TENTH SCHEDULE

Repealed.

CONSTITUTIONAL AMENDMENTS

First Amendment, 1951 : Introduced some changes in Article 19.

Second Amendment, 1952 : Unimportant.

Third Amendment, 1954 : Unimportant.

Fourth Amendment, 1955 : Amendment of Article 31 dealing with acquisition of private property.

Fifth Amendment, 1955 : Unimportant.

Sixth Amendment, 1956 : Unimportant.

Seventh Amendment, 1956 : The States Reorganisation Act of 1956 was passed and in order to implement the reorganisation according to the Act, certain Articles of the Constitution were amended. The first and fourth schedules also had to be amended.

Eighth Amendment, 1960 : Extension of reservation.

Ninth Amendment, 1960 : Redrawing of the boundary between India and East Pakistan.

Tenth Amendment, 1961 : Unimportant.

Eleventh Amendment, 1961 : Unimportant.

Twelfth Amendment, 1962 : Goa, Diu, and Daman was added to India as a Union Territory.

Thirteenth Amendment, 1962 : Unimportant.

Fourteenth Amendment, 1962 : Incorporation of Pondicherry as a Union Territory.

Fifteenth Amendment, 1963 : Unimportant.

Sixteenth Amendment, 1963 : Unimportant.

Seventeenth Amendment, 1966 : Unimportant.

Eighteenth Amendment, 1966 : Unimportant.

Nineteenth Amendment, 1966 : Amendment of Article 324 taking away the power of the Election Commission to appoint tribunals for deciding election disputes.

Twentieth Amendment, 1966 : Unimportant.

Twenty-first Amendment, 1966 : Sindhi was added to the Eighth Schedule.

Twenty-second Amendment, 1969 : Unimportant.

Twenty-third Amendment, 1969 : Extension of reservation.

Twenty-fourth Amendment, 1971 : A major amendment which was passed in the light of the Supreme Court ruling in Golaknath Case. Article 368 was amended to confer on the Parliament 'Constituent power'. The validity of this amendment was upheld in the Kesavananda Bharathi Case.

Twenty-fifth Amendment, 1971 : It was passed in the light of the Supreme Court ruling in the bank nationalisation case. Amended the provisions dealing with property rights.

Twenty-sixth Amendment, 1971 : It was passed in the light of the Supreme Court ruling in the privy purse case.

Twenty-Seventh Amendment, 1971 : Dealt with reorganisation of North-Eastern State and Union territories.

Twenty-eighth Amendment, 1972 : Abolition of the special privileges enjoyed by the I.C.S. Officers.

Twenty-ninth Amendment 1972 : Unimportant.

Thirtieth Amendment, 1972 : Unimportant.

Thirty-first Amendment, 1974 : Increased the number of seats in the Lok Sabha from 325 to 545.

Thirty-second Amendment, 1974 : Special provisions relating to Andhra Pradesh in the light of the Mulki Rules agitation in Telengana region.

Thirty-third Amendment, 1974 : Unimportant.

Thirty-fourth Amendment, 1974 : Unimportant.

Thirty-fifth Amendment, 1974 Sikkim was accorded the status of an 'associate State'.

QUESTIONS

1. The members of the Constituent Assembly were
 - (a) elected directly by the people.
 - (b) nominated by the Indian National Congress.
 - (c) representatives of Indian princes.
 - (d) mainly elected by the Provincial assemblies. (1979)
2. Which of the following is NOT included in the list of fundamental duties in the Constitution ?
 - (a) To safeguard public property and to abjure violence.
 - (b) Secularism.
 - (c) To uphold and protect the sovereignty, unity, and integrity of India.
 - (d) To abide by the Constitution and respect its ideals. (1979)
3. A case of dispute relating to the presidential election is referred to
 - (a) The Supreme Court.
 - (b) The Chief Election Commissioner.
 - (c) The Parliament.
 - (d) None of the above. (1979)
4. In general, the President of India has the same Constitutional authority as
 - (a) The British monarch.
 - (b) The President of the U.S.A.
 - (c) The President of Egypt.
 - (d) The President of U.S.S.R. (1979)
5. The Vice-President is elected by
 - (a) the members of the Rajya Sabha only.
 - (b) the elected members of Houses of Parliament.
 - (c) all the members in both Houses of Parliament.
 - (d) all the M.L.As. and M Ps. in the country. (1979)

6. Which are the States next to Uttar Pradesh having maximum representation in the Lok Sabha ?
- (a) Bihar and Maharashtra.
 - (b) Madhya Pradesh and Tamil nadu.
 - (c) Madhya Pradesh and Maharashtra.
 - (d) Bihar and Madhya Pradesh. (1979)
7. A candidate to the membership of the Lok Sabha should not be less than
- (a) 21 years (b) 25 years (c) 30 years (d) 35 years (1979)
8. Questions of disqualification of a member of Parliament have to be decided by
- (a) the Speaker or the Chairman of the respective House
 - (b) the President, according to the opinion of the Election Commission.
 - (c) The Election Commission, in consultation with the President,
 - (d) the Supreme Court. (1979)
9. What is the Power of the Rajya Sabha regarding money bills ?
- (a) It may take 15 days to make its recommendations to the Lok Sabha.
 - (b) It may amend or reject the bills.
 - (c) It may make recommendations to the Lok Sabha within 14 days.
 - (d) It has no powers at all regarding money bills. (1979)
10. Which language was last added to the Eighth Schedule of the Constitution ?
- (a) English (b) Sindhi
 - (c) Sanskrit (d) Urdu (1979)
11. Which of the following is contained in the Concurrent List ?
- (a) Agriculture (b) Education
 - (c) Fisheries (d) Police

12. The Constitution (43rd Amendment) Act
- (a) ensure the press freedom.
 - (b) restored the Supreme Court and the High Courts the power to consider the constitutional validity of Central or State laws.
 - (c) prescribed serious limitations on the Government's power to proclaim internal emergency.
 - (d) removed the right to property from the Constitution. (1979)
13. Which of the following states has to Legislative Council ?
- (a) West Bengal
 - (b) Tamil Nadu
 - (c) Maharashtra
 - (d) Bihar (1979)
14. The primary aim of the Panchayati Raj administration is
- (a) to work for rural development.
 - (b) to ensure the upliftment of Harijans.
 - (c) to arouse in the people continuous interest in the community development programmes.
 - (d) to increase agricultural production through the involvement of the people in extension programmes. (1979)
15. The original scheme of Panchayati Raj, introduced in 1959, operates at
- a) samiti and block levels.
 - (b) taluka and district levels.
 - (c) Village and samiti levels.
 - (d) village, block, and district levels. (1979)
16. Which of the following States has no Panchayat Raj institution at all ?
- (a) Assam
 - (b) Tripura
 - (c) Kerala
 - (d) Nagaland (1979)
17. In a parliamentary system of government, the executive is responsible
- (a) directly to the people
 - (b) to the legislature
 - (c) to the judiciary
 - (d) to none but the country (1979)

18. Indian Constitution was adopted and enacted by the-
Constituent Assembly of India on
(a) 9 December 1946
(b) 26 January 1946
(c) 26 November 1949
(d) 26 January 1950 (1981)
19. The preamble of our Constitution reads : India is a
(a) Sovereign socialist secular democratic Republic.
(b) Sovereign democratic socialist secular Republic.
(c) Socialist democratic secular Republic.
(d) Democratic sovereign secular socialist Republic.
20. Which Part of the Constitution speaks of economic and social ideals which are non-justiciable ?
(a) Fundamental Rights.
(b) Directive Principles of State Policy.
(c) Preamble.
(d) Fundamental Duties.
21. Which of the following Fundamental Rights have been deleted from Part III of our Constitution through a constitutional amendment ?
(a) Right to personal liberty.
(b) Right to freedom of religion.
(c) Right to property.
(d) Freedom of speech and expression. (1981)
22. Disputes regarding elections of President and Prime Minister are to be decided by
(a) The Parliament.
(b) The election Commission.
(c) The Supreme Court,
(d) A committee of the Parliament. (1981)
23. According to our Constitution, the Rajya Sabha
(a) is dissolved once in 2 years.
(b) is dissolved every 5 years.
(c) is dissolved every 6 years.
(d) is not subject to dissolution. (1981)
24. Fundamental Duties were introduced in the Constitution by

- (a) 40th Amendment (b) 42nd Amendment
(c) 43rd Amendment (d) 44th Amendment (1981)

25. In which of the following cases was the power of the Parliament to amend the Constitution curbed by the Supreme Court Judgement ?

- (a) Kesavananda Bharti case.
(b) Minerva Mills case.
(c) Habeas Corpus case.
(d) Golaknath case.

26. When a law is placed in Schedule IX of our Constitution, it becomes

- (a) An executive act.
(b) An item in the Union List.
(c) A constitutional amendment.
(d) Non-justiciable, (1981)

27. Which of the following High Courts has jurisdiction over more than one State/Union Territory ?

- (a) Delhi (b) Allahabad
(c) Patna (d) Gauhati (1981)

28. In which State has the President's rule never been imposed (till 1980) ?

- (a) Maharashtra (b) Andhra Pradesh
(c) Rajasthan (d) none of the above (1981)

29. Community Development Programme was inaugurated on Gandhi's birth day in the year

- (a) 1947 (b) 1950
(c) 1952 (d) 1959 (1981)

30. The main feature of the Panchayati Raj in India is

- (a) Rolling Plan.
(b) Decentralization of power.
(c) Money plan.
(d) Sharing of power between the Centre and the States. (1981)

31. The President of India is elected by

- (a) the people of India
(b) all the members of Parliament

- (c) all the elected Members of Parliament.
 - (d) all the elected Members of the Parliament and of State Legislative Assemblies. (1982)
32. Disputes relating to the election of the President are referred to
- (a) the Election Commission
 - (b) the Supreme Court
 - (c) the Vice-President
 - (d) the Parliament. (1982)
33. The President of India May send his resignation to
- (a) the Prime Minister
 - (b) the Vice-President
 - (c) the Parliament
 - (d) the Chief Justice of India (1982)
34. When a Bill is presented to the President, he
- (a) may refuse to sign
 - (b) may send it back for reconsideration
 - (c) may change certain clauses of the Bill.
 - (d) has to sign it ultimately. (1982)
35. What will follow if a Money Bill is substantially amended by the Rajya Sabha ?
- (a) The Lok Sabha may still proceed with the Bill accepting or not accepting the recommendations of the Rajya Sabha.
 - (b) The Lok Sabha cannot consider the Bill further.
 - (c) The Lok Sabha may send the Bill to the Rajya Sabha for reconsideration,
 - (d) The President may call a joint sitting for passing the Bill (1982)
36. The Council of Ministers is responsible to
- (a) the Prime Minister
 - (b) the President
 - (c) the people
 - (d) the Parliament (1982)
37. If a no-confidence motion is passed against a Minister,
- (a) the Minister alone has to resign.
 - (b) the whole Council of Ministers has to resign.

- (c) the Lok Sabha should be dissolved.
- (d) the Council of Ministers may seek a vote of confidence from the Lok Sabha. (1982)

38. For the Union Territories that do not have legislative assemblies, laws are passed by

- (a) the Union Ministry
- (b) the President of India
- (c) the Parliament
- (d) the Administrators of the respective Union Territories (1982)

39. Ideals of welfare state are contained in

- (a) the Directive Principles of State Policy.
- (b) The preamble of the Constitution.
- (c) the VII Schedule of the Constitution.
- (d) The Fundamental Rights Chapter. (1982)

40. The 42nd Constitution Amendment Act added a Chapter on

- (a) the Preamble of the Constitution
- (b) the Fundamental Rights
- (c) the Fundamental Duties
- (d) none of the above. (1982)

41. One of the advantage of the Panchayati Raj is that

- (a) it provides a parallel Government in rural areas
- (b) it serves the rural people well
- (c) it increases the employment opportunities in rural areas.
- (d) it gives a sense of political awareness to the rural masses. (1982)

42. Which of the following is *not* a Fundamental Right ?

- (a) Right against exploitation.
- (b) Right to equality.
- (c) Right to strike
- (d) Right to freedom of religion. (1982)

43. Which part of the Constitution reflects the mind and ideals of the framers ?

- (a) Preamble
- (b) Fundamental Rights
- (c) Directive Principles
- (d) Emergency Provisions (1983)

44. In which House is the Presiding Officer not a member of that House ?
 (a) Lok Sabha (b) Rajya Sabha
 (c) Vidhan Sabha (d) Vidhan Parishad (1983)
45. Which of the following writs is concerned with personal liberty ?
 (a) Mandamus (b) Habeas Corpus
 (c) Certiorari (d) Quo Warranto (1983)
46. Among the regional parties of India, which the maximum representation in the Lok Sabha ?
 (a) Telugu Desam (b) National Conference
 (c) A.I.A.D.M.K. (d) D.M.K. (1983)
47. The Panchayati Raj Institutions in India get their funds mainly from
 (a) voluntary contributions
 (b) property tax
 (c) local taxes
 (d) Government grants (1983)
48. The State of Nagaland is not a State in the political science sense since it has no
 (a) High Court of its own
 (b) nationalistic feeling of the people
 (c) Legislative assembly
 (d) sovereignty (1983)
49. Linguistic reorganisation of states took place in
 (a) 1947 (b) 1950
 (c) 1956 (d) 1971 (1983)
50. Which of the following is *not* an example of social legislation ?
 (a) Untouchability (Offences) Act
 (b) Suppression of Immoral Traffic Act
 (c) Dowry (Prohibition) Act
 (d) National Security Act. (1983)

ANSWERS

1. Ans. (d). According to the interim settlement of the Cabinet Mission Plan, the Constituent Assembly was to have its members elected by the Provincial Assemblies.
2. Ans. (b). Secularism is mentioned only in the Preamble of the Constitution. However, communal harmony is mentioned as a fundamental duty.
3. Ans. (a).
4. Ans. (a). It may be noted that, in U.S.A., Egypt and U.S.S.R., Parliamentary system of democracy does not prevail. In Britain there is Constitutional monarchy but the Parliamentary system of government prevails.
5. Ans. (c).
6. Ans. (a). The number of seats allotted to a State is approximately proportionate to its population.
7. Ans. (b).
8. Ans. (b). Questions are referred to the Election Commission which actually decides the matter. But it is the President who passes the formal order according to the opinion of the Election Commission.
9. Ans. (c). The Rajya Sabha may recommend amendments to the money bills. But the Lok Sabha has the power to reject such amendments.
10. Ans. (b). Sindhi is the only language to be added to the Eighth Schedule.
11. Ans. (b). It is not possible for a candidate to remember all the items contained in the three Lists. However, by considering carefully the responses, it should be possible for a candidate to answer the questions correctly.
12. Ans. (b). The powers of the Supreme Court and of the High Courts regarding Central and State laws had been drastically reduced by the 42 Amendment Act. The powers are restored by the next amendment.

13. Ans. (a).
14. Ans. (c). It may appear that all the responses give the correct answers. Increase in agriculture production and upliftment of Harijans are, no doubt, important goals of the Panchayati Raj administration but the basic aim was to involve the people in the Community Development programmes.
15. Ans. (d). All the States did not introduce the 3-tier system. But in states like Rajasthan and Andhra Pradesh which introduced the system in 1959 and in other States like Maharashtra and Gujarat which followed, the 3-tier system is operating.
16. Ans. (d). Nagaland has only Tribal Councils.
17. Ans. (b). The responsibility of the executive to the people is indirect.
18. Ans. (c).
19. Ans. (a). From the question it may be seen that the order in which the adjectives are arranged is equally important. But for this difference in order, there is no difference between responses (a) and (d).
20. Ans. (b). It may be noted that the Preamble of the Constitution speaks of political ideas as well as economic and social ideals.
21. Ans. (c).
22. Ans. (c). There is a mistake in the question. The Prime Minister is clubbed with the President wrongly. Election disputes relating to the Prime Minister are to be decided in the appropriate High Court in the first instance. Only in the matter of elections of the President and Vice-President of India, the Supreme Court has original jurisdiction. For all other functionaries such as the Prime Ministers, Central Ministers, Chief Minister, State Ministers, Speaker and Chairman etc., the appropriate forum for election disputes is the High Court.

23. Ans. (d).
24. Ans. (b).
25. Ans. (d). In the Golaknath Case the Supreme Court held that the amending power of the Parliament was limited. In the Kesavananda Bharati Case the Supreme Court held that the amending power of the Parliament was not limited but was subject to the condition that 'the basic structure' of the Constitution should not be altered. In the Minerva Mills Case also, the Supreme Court upheld the same view. In the Habeas Corpus Case the question of amending power was not involved.
26. Ans. (d).
27. Ans. (d). Gauhati High Court has jurisdiction over all the North Eastern States and Union territories.
28. Ans. (a).
29. Ans. (c).
30. Ans. (b). It may be seen that the panchayati Raj does not have much to do with the Five-Year Plans.
31. Ans. (d).
32. Ans. (b). Note that this Question is repeated from an earlier year.
33. Ans. (b).
34. Ans. (b). Response (a) in this Question expresses the same idea as 'the President may withhold assent'. But the wording is not proper. The president does not have to sign a Bill ultimately ; he may withhold assent indefinitely.
35. Ans. (a). The recommendations of the Rajya Sabha in the matter of a money bill are not binding on the Lok Sabha which has got the final authority regarding a money bill.
36. Ans. (d). Please note that the term 'Council of Ministers' includes the prime Minister also. Although the Council

of Ministers holds office during the pleasure of the president, it is not responsible to the president.

37. Ans. (b). Even when the Lok Sabha loses its confidence in one Minister, the entire Ministry has to because of the principle of collective responsibility of the Cabinet.
38. Ans. (c).
39. Ans. (a). The Preamble of the constitution outlines only the broad ideals. The social and economic ideals of Welfare State are outlined in part IV.
40. Ans. (c).
41. Ans. (d). The Panchayati Raj institutions cannot be called a parallel Government. panchyati Raj does not increase the employment opportunities in rural areas in any significant proportion. Response (b) is vague.
42. Ans. (c).
43. Ans. (a). Preamble is considered to be the key to the constitution and therefore it reflect the mind and ideals of the framers better than any other part of the constitution.
44. Ans. (b). Vice-president who is the Chairman of Rajya Sabha is not a member of either House of the Parliament. President is not a member of either House of the Parliament, but he is a wing of the Parliament.
45. Ans. (b). Habeas Corpus direct a Government authority to produce a person who may have been detained without a proper warrant. So this writ is meant to protect personal liberty. Mandamus is the writ issued to an official to do or not to do an act. Prohibition is the writ which directs the lower court not to go further with a case for which it is expected not to have jurisdiction. Certiorari is the writ issued to a lower court to send its records for verification regarding the exercise of jurisdiction. Quo Warranto is the writ issued to a person holding an important office in the State to establish his claim to hold the office.

46. Ans. (d).
47. Ans. (d). The voluntary contributions to panchayati Raj are negligible. The local taxes can be collected by the Panchayati Raj but it is generally not done. Property tax collections are meagre. So Panchayati Raj institutions mainly depend on Government grants.
48. Ans. (d). In India provinces are called States. In the political science sense, a State is a sovereign entity. So only India is a State.
49. Ans. (c).
50. Ans. (d). All the other three Acts are social legislation, since they seek to curb social evils.

PART III
GENERAL SCIENCE

GENERAL SCIENCE

The importance of General Science as a major part of General Knowledge of a well-educated person needs no elaboration. In the Competitive Examinations of various kinds, questions on General Science are always put as a matter of routine. However, the scope of General Science relevant for different Competitive Examinations definitely varies. In the Higher Competition Examinations, in particular, UPSC Civil Services Examination, the standard in General Science expected of the candidates is quite high. Unlike certain other parts of General Studies which are connected with day-to-day events in the society around us, science comes into picture only as a matter of serious study. Yet it is well-known that there are hundreds of phenomena in ordinary life whose explanation can be found only in the various sciences.

Any and every science may be covered by the term 'General Science'. However, traditionally the term has been applied to sciences in two important regions, physical and biological. Physical Sciences include Physics, Astronomy and Chemistry. Biological Sciences are Zoology and Botany and their applications, Human Physiology and Medicine, Agriculture and Animal Husbandary. Each of these Sciences is so voluminous that it is studied independently for years together by the scientists. Besides it is really difficult to grasp some of the basic propositions, theories and laws in various Sciences. With all these limitations, an attempt has been made to present the basics of each of these Sciences in the following chapters. A chapter on Technology has also been added. It is possible that some important matter relevant for the examination-questions have been omitted in our treatment. However it is hoped that treatment of General Science in this Part will, by and large satisfy the requirements of the Competition Candidates.

with each other and attempt to have relative motion. There are different kinds of friction. Static Friction occurs when a body which is at rest on another body tries to start relative motion. Dynamic Friction applies when there is already some relative motion between two bodies in contact. When one body rolls on another, the friction is called rolling friction. When a body slides on another, the friction is called sliding friction. Static friction is more than dynamic friction. Rolling friction is much less than sliding friction. Friction during pull is less than friction during push.

Acceleration Due to Gravity : The acceleration with which a freely falling body moves towards the earth. This is the acceleration caused by the gravitational attraction of the earth and is independent of the size, shape, mass or other properties of bodies. The normal rate of acceleration due to gravity on the surface of the earth is 982 cm/sec^2 .

Work : is said to be done when a force, acting on a body, moves it through a distance.

Power : The rate of doing work.

Energy : A fundamental phenomenon in the material world. The entire universe consists of matters and energy which are convertible into each other. There are different forms of energy e.g. chemical, heat, mechanical, light electricity, magnetism and nuclear. In the case of mechanical energy, it is measured as the capacity to do work.

Trajectory : The path followed by a projectile i.e., any body projected into open space. The trajectory of projectile in the gravitational attraction of earth (assuming no resistance of air) is a parabola.

Weight : Is the force with which a body is attracted towards the centre of the earth. Although it is proportional to the mass of the body, it is different from the mass. Mass of a body remains constant whereas weight will vary from place to place on the earth and elsewhere in the universe. Weightlessness is a condition experienced by material bodies when the gravitational attraction is nearly zero.

Simple Pendulum : A body which is freely oscillating at the extremity of a string tied to fixed point. The period of the pendulum i.e., the time taken for one oscillation is given by the formula $T = 2\pi \sqrt{\frac{l}{g}}$, where 'l' is the length and 'g' is the acceleration due to the gravity. Thus period is independent of the angle of oscillation and of the mass of the body. If 'l' increases 'T' will increase ; if 'g' decreases 'T' will increase. 'L' increases in summer and hence clock loses time. 'G' increases when clock is taken to a mine, but decreases on a mountain top.

Law of Conservation of Energy : Energy can be neither created nor destroyed but can be changed from one form to another. When energy in one form disappears, an equivalent amount of energy in other forms appears somewhere. (This law of conservation applies only when the quantity of matter involved remains the same).

Phenomena :

1. A standing passenger in a running bus is thrown forward if the bus stops suddenly. This because the feet come to rest suddenly whereas the upper part of the body of the passenger retains the forward momentum.
2. When a bus starts from rest, a standing passenger has greater tendency to fall backward than squatting passenger. This is because the centre of gravity of the squatting passenger is much less high than that of the standing passenger. Both the squatting passenger and the standing passenger will tend to fall backward because their seat or feet acquires momentum suddenly whereas the upper part of the body is still at rest.
3. When a person wants to jump out of the moving bus or train, he will have to run in the same direction for some time after jumping so that he may not fall. If he tries to stand firmly at the same place where he has jumped, his feet will come to rest immediately whereas the upper part of the body will still retain momentum as a result of which he will tend to fall forward.

4. A body in motion ordinarily comes to rest by itself on the ground. This is because the forces of friction tend to retard motion. Friction is always at play, whether on the ground or in the atmosphere. However, in outer space a moving body will continue to move unless it is acted upon by the gravitational attraction of some celestial body.
5. A cyclist has to apply a greater force at the time of starting than when the cycle is in motion. This is because initially the static friction has to be overcome. Later only the rolling friction which is much less than static friction has to be overcome.
6. It is easier for a man to pull a barrel than to push it along the road. This is because friction throughout the circular rim of the bottom will have to be overcome in the case of push whereas only a small part of the rim remains in contact with the ground in the case of pull.
7. A cyclist driving along a curved road bends inward so as to provide the **centripetal force** necessary to overcome the **centrifugal force** which comes into play in the case of a motion along a curve. The former force is towards the centre of curvature of the curve and the latter acts away from the centre.
8. A passenger sitting in a car tends to be thrown outward when the car takes a sudden inward turn. This is because the centrifugal force acts on the upper part of the body while its base remains fixed to the car.
9. It is dangerous for a car to take a turn along a curve on a horizontal road with a very high speed. This is because the inner tyres may lose contact with the ground, overturning the car outwards. Outer tyres will be subject to extreme friction and hence will suffer much wear and tear.
10. In the case of a four wheeler, the higher the location of the centre of gravity, the shorter the axis of the carriage, and sharper the turn which it takes, the greater will be the chances of overturning. In other words, the chances

of overturning are directly proportional to the height of the centre of gravity, inversely proportional to the length of the axis of the carriage and inversely proportional to the radius of curvature of the curved track.

11. A rail track or metal road is banked on the outside so that, at a particular speed, there will be no friction between the road and the wheels and no chances of overturning. If the vehicle moves at a higher speed, friction will gradually increase and the chances of overturning will be there. If the actual speed is less than the specified speed, friction will be acting outward so that there is the chance of slipping.
12. If a feather and an iron piece are released from the same height in vacuum, both will fall on the ground simultaneously. This is because the acceleration due to gravity is independent of the mass or nature of the body. If the feather and the iron piece are released in atmosphere, obviously the feather will take a longer time because of the air resistance.
13. A body weighs slightly more at the poles than at the equator since the polar radius is nearly 40 kilometres less than the equatorial radius.
14. The weight of a man on the surface of moon will be only about one-sixth of his weight on the earth. This is because the acceleration due to gravity on the moon is about one-sixth that on earth.
15. It is dangerous to allow extra passengers on the upper deck of a double-decker bus. This is because the centre of gravity of the bus will be raised and so chances of overturning while taking a turn increases.
16. A person climbing up the hill leans forward because, otherwise, he will tend to fall backward. Similarly a person coming down from a hill leans backward so that he may not be dragged along by the horizontal component of the reaction on him by the ground.
17. When a bullet is fired, the gun or rifle kicks backward. This is according to Newton's third

18. A Boat man pushes water backwards with his oars in order to move forward. This is also according to Newton's third law of motion.
19. Men are able to skate on ice because of the operation of the law of reaction.

Hydrostatics

Archimedes Principle : The apparent loss of weight of a body, totally or partially immersed in a liquid, is equal to the weight of the liquid displaced by it. The same principle applies to any fluid also,

Laws of Floatation : The following conditions must be fulfilled for the equilibrium of a floating body : (1) The weight of the body must be equal to the weight of the displaced liquid. (2) The centre of gravity of the body and the centre of gravity of the displaced liquid (centre of buoyancy) must be in the same vertical line.

Pascal's Law : Liquids transmit pressure equally in all directions. This means that pressure on unit area of any part of the surface of a liquid contained in a vessel will be the same. This principle is applied in a hydraulic press.

Phenomena :

1. A solid steel bar sinks in alcohol but floats on mercury. This is because the density of steel is more than that of alcohol but is less than that of mercury.
2. Ice floats in water because the density of ice is 0.9 gm/cc. whereas the density of water is 1 gm/cc.
3. A piece of ice is floating on water in a tumbler which is filled to the brim. When the ice melts, water will not overflow but will remain full to the brim since the ice which has melted will occupy the same volume as the amount of water which it has produced by melting.
4. As a ship enters the sea from the river, it rises. This is because sea water being denser than the river water, the volume of the liquid to be displaced in the sea will be less than the volume of water to be displaced in the river.

5. A needle sinks in water whereas an iron ship floats in the sea. This is because the needle is a solid body whereas the iron ship is hollow enough to displace the required volume of water to allow it to float.
6. It is easier to lift a heavy stone when under water than in air. This is because the weight of the stone under water is reduced by the weight of the displaced water for the purposes of lifting.
7. A certain quantity of feathers with mass 1 kg weighs less than a 1 Kg piece of lead. This is because the volume and weight of the air displaced by feathers is considerable compared to the case of lead. So the apparent loss of weight suffered by the feathers will be much more than the loss suffered by the piece of lead.
8. A parachute is used by a person to descend safely in the case of an air accident. This is because the parachute which is in the form of an umbrella is subjected to upward thrust by the displaced air. This upward thrust reduces considerably the speed of the descending person.

Properties of Matter

Surface Tension : The tension that is experienced on the open surface of any liquid. The open surface of a liquid in a vessel is in a state of tension which is the effect of the forces of attraction existing between the molecules of a liquid. This tension makes the surface act like a stretched elastic membrane. The tendency of surface tension is to minimise the surface area of the liquid.

Capillary Action : The phenomenon of rise or depression of liquid surface in a narrow tube. It is caused by surface tension. Formation of liquid films, drops and bubbles are the results of capillary action.

Elasticity : The property of an object or material by virtue of which it tends to regain its original form or dimensions when the outside forces acting upon it causing deformation are removed. The extent of linear elasticity is given by Hooke's law : $\frac{\text{Stress}}{\text{Strain}} = \text{Constant}$ where stress is the force applied and

strain is the linear extension produced. However, if sufficiently large forces are applied suddenly on a body, it may suffer permanent deformation.

Phenomena :

1. A small liquid drop has spherical shape. This is because surface tension ensures minimum surface area for a given volume of liquid. The surface area is minimum for a given volume when the surface is a sphere.
2. Blotting-paper absorbs ink because of capillary action. Ink rises through the numerous pores found in the blotting-paper.
3. Capillary action also explains the rising of oil in the wicks of an oil lamp.
4. A ball which falls on the ground bounces up. This is due to the property of elasticity. When the ball hits the ground it tries to recover its original shape and applies a pressure on the ground. The reaction of the ground pushes the ball up.
5. A ball which is thrown on the ground does not keep bouncing indefinitely because of air resistance. The air resistance gradually reduces the speed.
6. An elastic ball bounces higher at higher altitudes because air resistance there is lower and the gravitational attraction is also slightly less.

Heat

Thermometer : An apparatus to find out the temperature. There are different kinds of thermometers, all based on the fundamental working principle that substances expand on increases of temperature.

Scales of Temperature : The three scales which are in common use are Kelvin (Absolute), Centigrade (Celsius) and Farenheit. Their relations are given below :

Scale	Freezing point of water	Boiling point of water
Celsius	0°C	100°C
Farenheit	32°F	212°F
Kelvin	273°K	373°K

Equations : $1^{\circ}\text{C} = 1^{\circ}\text{K}$; $1^{\circ}\text{C} = \frac{9}{5}^{\circ}\text{F}$.

Absolute Zero : The lowest possible temperature in the universe. Below this temperature matter cannot exist unless it has negative volume. It corresponds to $-273.15^{\circ}\text{Celsius}$.

Heat : A form of energy which is related to the temperature difference between bodies. It is actually the kinetic energy of the molecules in the substances.

Expansion due to heat : All substance—solids, liquids and gases—expand when heated and contract when cooled. Expansion may be linear, surface (superficial) and volume.

Linear Expansion : The co-efficient of linear expansion is the rate of increase in the length of a solid to the original length as a result of 1°C rise of temperature.

Surface Expansion : The co-efficient of superficial (surface) expansion of solid is equal to twice the linear co-efficient of the body. Both solids and liquids have surface expansion.

Volume Expansion : The co-efficient of volume expansion of a solid is equal to three times its linear co-efficient. Liquids and gases have volume expansion many times more than solids.

Boyle's Law : For any gas the product of pressure and volume is constant for a given temperature. $PV = RT$ where P is the pressure ; V volume ; T temperature in the absolute scale ; R , a constant.

Calorie : The quantity of heat necessary to rise 1 gram of water through 1°C . $1 \text{ Calorie} = 1000 \text{ calories}$.

Calorimeter : A device used to measure or calculate the quantities of heat involved in a problem.

Specific Heat : A measure of heat absorption of the substance. Quantity of heat absorbed by a substance is given by the formula $Q = mst$ where Q is the quantity of heat absorbed ; m the mass of the substance ; s the specific heat ; and t the rise in temperature.

Latent Heat : When a liquid in a vessel is heated the temperature rises up to a particular point that there is no increase of temperature. The heat is utilised to change the liquid into gas.

tional heat is known as latent heat of vaporization. Similarly when a liquid is gradually cooled, temperature will fall to a particular value and will not decrease further but any further loss of heat is utilized for conversion of the liquid into a solid (condensation). The additional heat involved in this process is known as latent heat of fusion. Latent heat of vaporization of water = 540 c/gm : Latent heat of fusion of water = 80 c/gm .

Melting Point : A heated solid begins to melt and turn into liquid at a particular temperature known as its melting point. At the same temperature the same substance in the form of liquid will begin to freeze (solidify) if it was earlier at a higher temperature. So it is also the freezing point.

Boiling Point : When liquid begins to boil and change state to a gas at a particular temperature, it is called the boiling point of the substance. At the same temperature the same substance in the form of gas will begin to condense and turn into a liquid if it was earlier at a higher temperature. So the same temperature is also called condensation point.

Laws : The boiling point of a liquid is directly proportional to the pressure on its surface. The melting point of a liquid is directly proportional to the pressure in the case of substance like sulphur whose volume increases on melting. In the case of substances like water whose volume decreases on melting, the melting point is inversely proportional to the pressure. The maximum boiling point of a material is 5700°C (for tungsten). The maximum melting point of a substance is 3380°C (for tungsten).

Transmission of Heat : Also known as transference of heat. Heat is transferred from one body to another through three modes called conduction, convection and radiation.

Heat Conductivity : The heat conductivity of a material is the capacity of the material to conduct heat. Substances having high conductivity are called good conductors and substances with very low conductivity are known as bad conductors. Silver has highest heat conductivity. Metals are in general good conductors. Some bad conductors are glass, air, cotton wool etc.

Heat Conduction : When two bodies with different temperatures are kept in contact with each other, heat flows from the body with higher temperature to the body with lower temperature. The rate of heat flow is directly proportional to the surface area of contact, temperature difference and to the heat conductivity of the body with higher temperature and inversely proportional to the thickness of the body.

Heat Convection : Convection occurs because of the basic physical law that, in fluid, layers of lower density will be at the top and layers of the higher density will be at the bottom. When water in a kettle is heated from the bottom, the bottom layers of water get heated first and consequently become less dense (rare). This rare water goes up to occupy the upper layers. To fill in the space at the bottom, water from the top at higher density descends. Thus convection currents are set up in the fluid. Heat Convection explains a number of important natural phenomena like ventilation, wind systems and ocean currents.

Heat Radiation : Radiant heat is one part of the electromagnetic spectrum.

Law : A black body absorbs heat much more quickly and more effectively than a white body ; the black body also gives away heat as quickly as it absorbs.

Law of Cooling : The rate of cooling of a body (energy emitted) is directly proportional to the fourth power of the mean difference in temperature between the body and its surroundings.

Anamolous expansion of water : As the temperature of any liquid decreases its volume will decrease and density will increase. This is true of water upto 4°C . As we reduce further the temperature of water the volume increases upto 0°C at which temperature it begins to freeze. Thus at 4°C water has minimum volume and maximum density. This expansion of water beyond 4°C is known as anomalous expansion.

Phenomena :

1. In the case of a clinical thermometer a constriction is provided at the mouth. This is to ensure that the

mercury that has flown into the graduated portion does not flow back into the mouth immediately. As a result the temperature may be read leisurely.

2. A clinical thermometer should not be dipped into very hot water. This is because the thermometer is graduated only upto 110°F but the boiling point of water is 212°F . So the thermometer may crack in very hot water.
3. At -40° , the readings in Celsius and Fahrenheit scales of thermometer will coincide. That is $-40^{\circ}\text{F} = -40^{\circ}\text{C}$.
4. In railway tracks, a small space is left between two rails. This is to allow for expansion of the iron rails during summer. But for this space the rails may bend.
5. When a steel bridge is built, one end of the bridge is simply mounted on rollers while the other is fixed. This is to allow for expansion in summer and contraction in winter.
6. A platinum wire is used inside the holes in a glass rod. This is because the co-efficients of linear expansion of platinum and of glass are equal and so the space between the glass rod and the hole will remain the same in all seasons.
7. A cycle pump gets hot while pumping. This is because the work done in pumping is partially used to raise the temperature of air inside the pump. Besides sudden compression produces a slight rise in temperature.
8. The air coming out of a punctured tyre feels cool. This is according to the law that sudden decrease of pressure produces a slight decrease in temperature.
9. Water mixed with alcohol is applied to the forehead of a person having high fever. This is because alcohol vapourises at room temperature, thereby absorbing the latent heat of vaporization from the body. This will remove the heat from the body of the person and may reduce the temperature to some extent.
10. A piece of ice is put in a drink to make it cool. The ice rapidly takes the latent heat from the drink and turns.

into water. In the process the temperature of the drink is rapidly reduced.

11. Water in an earthen pot remains cooler than in a metallic vessel in summer. The small pores in an earthen pot allows the water to ooze out. In summer, because of the high temperature outside, the water particles which come to the surface evaporate taking the latent heat from the outer surface of the body. This reduces the temperature of the exterior of the pot. Thus the inside temperature is maintained in the pot. In the case of a metallic vessel this phenomenon does not occur. As the temperature of the outer surface of the vessel increases, heat is passed inside to raise the temperature of the water.
12. Water in a pond remains cool even on a hot summer day. This is because the water particles on the surface evaporate taking the latent heat of vaporization from the water in the pond.
13. Water is sprinkled in the open space in front of the house in summer. The sprinkled water immediately vaporizes taking the latent heat from the ground. This reduces the ground temperature.
14. Steam produces burns more serious than boiling water. This is because steam contains enormous heat in the form of latent heat.
15. We perspire much more in summer than in winter. This is because of the mechanism of the body which constantly expels heat from the body in the form of sweating. When sweating takes place, the excess heat from the body is utilized as latent heat of vaporization. Thus bodily temperature is maintained.
16. Wet clothes dry slowly on rainy day. This is because the air on a rainy day, saturated with water vapour, does not allow much evaporation to take place from the cloth.
17. It is easier to cook in a pressure cooker than in an ordinary vessel. This is because, in a pressure cooker, very high pressure is built up and hence

point of water increases. So the heat contained within the cooker will be much more, enabling quicker cooking of the materials inside.

18. It takes longer to cook in the hills than in the plains. This is because atmospheric pressure in the hills is lower and consequently water boils at a lower temperature. This results in less heat available for the materials to cook.
19. Salt is mixed with ice in an ice-cream box. This is because salt lowers the temperature of ice upto -22°C .
20. The outer surface of a glass tumbler containing ice water becomes wet. Since the temperature of the outer surface is considerably low, the water vapour in the atmosphere gets condensed into water particles which hang on to the surface.
21. Ice is wrapped in a blanket or sawdust. This is to prevent the melting away of ice. Blanket or sawdust is a bad conductor.
22. A thick glass tumbler often cracks when a very hot liquid is poured into it. Because of heat, the inner surface expands but, since glass is a bad conductor, the outer surface does not expand. The unequal expansion in the different layers of the tumbler results in a stress developing between the two surfaces, resulting in its breakage.
23. The sun is able to maintain its energy supply from the surface, because, the energy produced in the core as a result of nuclear reaction is transmitted to the surface through convection currents.
24. A big fire in the open ground appears to be fanned by strong winds. This is because of convection. The air coming into contact with the fire gets rare and goes up, and to fill in the partial vacuum the horizontal layers of air rush towards the fire.
25. Ventilation is provided in a room in order to maintain fresh air. The air in the lower layers gets hot because

of human breathing and concentration of carbon dioxide and goes up. The ventilation allows this air to go out. Open air from outside rushes inside to fill in the partial vacuum.

26. A woollen sweater is used in winter. This is because woollen fibre has the characteristic of trapping the air in the pores in them. When air from outside touches the woollen cloth it gets trapped there and acts as a shield preventing the hot air inside the body from going out. Thus the bodily temperature is maintained. Woollen sweaters will lose much of their utility if they are compressed hard.
27. Buffaloes like to remain in water for long during summer. The black skin of the buffaloes absorb heat enormously. In water the heat will be passed on to the water.
28. We wear light-coloured clothes in summer and dark-coloured clothes in winter. This is because light-coloured clothes absorb less heat than the dark ones. In summer this results in less atmospheric heat being absorbed into the body. In winter the dark clothes enable more absorption of heat, when exposed to the sun.
29. The walls and roofs of the houses are white-washed since white washing results in absorption of less heat in summer and losing of less heat from the room to atmosphere in winter.
30. A fire brigade man wears highly polished helmets, since a polished surface reflects away bulk of the heat which is incident on it.
31. Water from hand pumps appears warm in winter and cold in summer. In winter outer atmosphere is at a lower temperature than water inside. So when the water comes out, it appears warmer. The reverse is the case in summer.
32. Cloudy nights are warmer than clear nights. The clouds act as a shield reducing radiation of the heat on earth's surface into open space during night.

33. A piece of metal feels colder in winter and hotter in summer compared to a piece of wood. Metal is a good conductor and so, in summer, when you touch it, heat passes from the metal piece (at atmospheric temperature) to the human body. In the case of wood, although it is at the same atmospheric temperature, much less heat passes through the body. So we feel that metal is hotter than wood.

LIGHT

It was once thought that light consisted of discrete particles. Later light was interpreted as a wave in a mysterious medium. Now it is understood to be a band in the electromagnetic spectrum within a narrow range of wavelengths. Different colours correspond to different wavelengths (and hence frequencies).

Rectilinear propagation of light : Light travels in straight line. This is well demonstrated by the passage of light through a small hole.

Reflection : On a plane mirror, light is reflected according to the rule that the angle of incidence of a ray of light is equal to the angle of reflection. Besides, in a plane mirror the law of *lateral inversion* applies i. e., the right hand of the object appears as the left-hand of the image.

In a spherical mirror a beam of light rays is not focussed sharply. This is called *spherical aberration*. But in a parabolic mirror, a parallel beam of light is focussed at the focus of the parabola. In a concave mirror a ray of light from the centre of curvature is focussed through the focus of the mirror. Depending on the distance of the object, the image will be enlarged or diminished, real or virtual, direct or inverted. In a convex mirror only a virtual image can be formed. The difference between a real image and a virtual image is that a real image can be got on a screen whereas a virtual image can only be seen.

Refraction : When light passes from one medium to another, its path gets deflected. This phenomenon is known as refraction.

Law of Refraction : When light passes from a rare medium to a dense medium, it deflects towards the normal, i. e., the angle of refraction is less than the angle of incidence. The opposite happens when light passes from a dense medium to a rare medium. The relationship between the angle of incidence (i) and angle of refraction (r) is given by the formula :

$$\frac{\sin i}{\sin r} = \text{Constant}$$

This constant is called the refractive index of one medium with respect to another. The refractive index depends on the two media and the colour of light.

Lens : Focus of a lens is called the principal focus. It is the point on the principal axis through which rays of light parallel to the principal axis will be reflected or refracted. Focal length of a lens is the distance from the optical centre of the lens to the principal focus.

Total internal reflection : When a ray of light passes from a dense medium to a rare medium, the ray deflects away from the normal. If the angle of incidence is sufficiently large, the ray will be refracted by more than 90° so that light will not emerge from the dense medium but will be totally internally reflected. This is known as total internal reflection. The phenomenon will occur when the angle of incidence is above a particular value, known as the *critical angle*.

Doppler's Principle : When the distance between the source of wave and the observer increases due to their relative motion, the frequency of the wave appears to decrease. The converse is also true. In the case of the light wave, the shift will be towards the red end of the spectrum.

Phenomena

1. A straight stick appears bent towards the surface when partly immersed in water. This is due to refraction of light from a dense medium.
2. A coin laying at the bottom of a vessel containing water appears to be raised. This is due to refraction.

a dense medium. The apparent depth will be less than the actual depth.

3. The stars in the sky appear to be more distant than they actually are. This is because light coming from the rare medium of outer space passes through the dense medium of atmosphere to reach the earth. so the apparent distance will be more than the actual distance,
4. A ray of light from the sky travels through the atmosphere in a curved path which is concave towards the earth.
5. *Zenith Effect* : As a ray of light from a heavenly body is seen by an observer on earth, the image will be seen closer to the Zenith than the body actually is. The zenith effect is much more prominent near the horizon than near the zenith. So stars and sun appear closer to the zenith than they actually are. In particular when the sun rises or sets, it appears elliptical and bulging because of this effect. The zenith effect is also responsible for the fact that we are able to see the moon a few minutes before it has actually risen above the horizon.
6. *Mirage* : Is a phenomenon that occurs in deserts and in straight roads during hot summer afternoons. It is caused by total internal reflection. Ray of light starting from the top of a tree will travel downwards in a curve and will be totally internally reflected so that the observer will see the image as in a mirror. A similar phenomenon which occurs in very cold regions is looming. In the vicinity of the cold surface of a lake or snow field, the image of a ship or any other body will appear lifted in mid-air.
7. A convex mirror is used by a motorist to get a miniature erect image of the things behind. It also covers a wider area. But the defect in the convex mirror image is that it does not give a clear idea about dimensions and distance. So, generally, a plane mirror is also fixed to get a clear idea about nearby objects behind.

8. A dentist or ophthalmologist uses a concave mirror to get a powerful beam of light at the focal point which is to be tested. The search light also uses concave mirror for the same reason.
9. A prism is able to display seven colours of light. This is because the white light of the sun consists of seven component colours VIBGYOR (Violet, Indigo, Blue, Green, Yellow, Orange and Red). Since each colour has a different refractive index, the prism resolves the different colours.
10. A red object appears red in daylight because it absorbs all colours other than its own and reflects only the light of its own colour.
11. A red object will appear dark in green light. This is because the green light is simply absorbed and there is no red light available for the body to reflect it.
12. *Rainbow*: The main scientific principles behind the formation of the rainbow are total internal reflection and scattering of light. Rainbow is a colour-effect relative to an observer who stands opposite the sun just before or after heavy rain. At a particular angle, the sunlight is resolved into the constituent colours by the water particles suspended in the atmosphere and these colours are totally internally reflected. In the rainbow, violet will be inside and red outside.
13. The sky appears blue because of the scientific principle of scattering of light. The scattering of a particular light is inversely proportional to the fourth power of its wave length. The blue end of the spectrum having the shortest wave length is scattered much more effectively than the red light. This imparts the blue colour to the sky.
14. Clouds are generally white. This is because the water particles and dust in the cloud do not scatter light. So they appear in the white light of the sun as a white colour.

15. Diamond looks brilliant in light. The refractive index of diamond is the maximum for all substances and its critical angle is low. As a result a ray of light which goes into the diamond gets totally, internally reflected a number of times before it comes out of the edges of the diamond which have been cut carefully for this purpose. A directional light, as in a laser, is produced.
16. Stars give the impression of twinkling, since the different images of the star passing through atmosphere enter the eye of the observer in quick succession. This is the case for all point-sources of light. Even on earth the same phenomenon may be observed at very long distances in a plain area. On the other hand, planets do not twinkle since they are bigger bodies and images of light come from numerous points on the body and hence a definite image of the whole body is formed.
17. The sun appears red at sunrise and sunset. This is because the scattering of blue light in the spectrum is much more pronounced than red light. The red rays of the sun pass through the atmosphere straight while blue rays get scattered.

Sound

Sound is a form of energy. Sound waves are longitudinal waves and propagate only in a medium. Sound is also known as elastic wave since it makes use of the elastic properties of the medium for propagation. The velocity of sound is different for different media. In air the speed of sound is 330 m/sec. The velocity of sound increases with the density of the medium and also with temperature. Human audibility is in the range 20 hertz to 20,000 hertz.

Ultrasonic : Waves with frequencies above 20,000 hertz are called ultrasonic waves. Obviously they are more powerful than ordinary sound and are harmful for living creatures.

Infrasonic : Sound below 20 hertz is known as infrasonic. Sometimes dogs can hear infrasonic sound.

Supersonic : speed higher than that of sound.

Supersonics : studies the effects of bodies moving with supersonic speed.

Mach Number : is equal to the ratio of the speed of an object to the speed of sound. It applies only to objects moving faster than speed.

Phenomena

1. A flash of light is seen much before the sound of thunder is heard. This is because of the difference between the speeds of the light and of sound.
2. A gun fired on the moon's surface cannot be heard, since there is no atmosphere on the moon.
3. The rumbling sound of thunder is due to the phenomenon of *reverberation*. When echoes get mixed up with the original sound, reverberation occurs.
4. Bats are able to fly in dark making use of the ultrasonic waves which they produce. From the echo of the sound they will assess the position of objects.

Electricity and Magnetism

Coulomb's Law : The force between two electric charges is directly proportional to the product of the charges and inversely proportional to the square of the distance between them. The force will be attractive if the charges are opposite ; and repulsive, if the charges are like charges. A similar law is applicable to magnetic poles also.

Electric Current : Is the flow of electric charges. Generally the flow occurs between the two terminals of a wire which have a potential difference between them. A circuit in which electric current flows is known as an electric circuit. Current is said to flow in the direction opposite to the direction in which electrons flow.

Direct Current : If the current flow in a circuit is continuously in the same direction it is called direct current (D.C.). If the electrons flow alternatively forward and backward the current is called alternating current (A.C.)

Ohm's Law : At constant temperature the current flowing through a conductor is proportional to the potential difference.

Electro Magnet : A device to produce a temporary magnetic field using Faraday's Law of electromagnetic induction.

Magnetic Poles : In a magnet the pole which points to the north is considered as the north pole and the pole which points to the south is called the south pole. The magnetic poles of the earth are situated at the extremities of a magnetic axis which is inclined at an angle of 18° to the geographical axis.

Electrolysis : The passing of electric current through the conducting solution so as to produce ions. This results in the decomposition of electrolytes at the electrodes by the passage of the current. It is used for electroplating and manufacture of metals and compounds.

Kilowatt-hour (KWh) : is the quantity of electricity consumed when a bulb of 1000 watts burns for an hour. It is also called a unit.

Phenomenon :

1. Vacuum is provided inside an electric bulb. This is to prevent oxidation of the burning coil inside. Instead of vacuum an inert gas may be filled.
2. When an electric bulb breaks, a bang is heard. This is because air rushes into the bulb to fill the vacuum creating the sound.
3. Copper wire is not used as a heating element in electrical appliances. This is because copper melts at relatively low temperature of 1083°C .
4. Wires connecting the electric filament remain less hot compared to the filament. This is because the tungsten filament is having a very small radius compared to the wire. Resistance is inversely proportional to the cross-section area.
5. It is dangerous to touch a live electric wire since electric current will freely pass through human body which is good conductor of electricity. The shock which occurs when electricity passes may prove fatal.

6. Earthing is provided to electrical appliances. This is done so that if a short circuit occurs the current may automatically pass to the earth without harming the user or the appliances.
7. Fuse wires are provided in electrical installations as a safety device. It consists of a wire with a low melting point such as tin. When due to any reason excessive current passes through the circuit the wire will automatically melt and break the circuit. This way further damage due to excessive current will be avoided.
8. A regulator is provided with an electrical fan. The purpose is to regulate the electric current passing through the motor. This results in regulating the speed of the motor.
9. Static electricity experiments do not work well in humid weather since the electric charges leak away in large quantities, as humid air is a good conductor of electricity.
10. The communication contact between a spaceship and the earth breaks down when the spaceship goes to the other side of the satellite or planet. Electromagnetic waves which enable contact of the spaceship with the earth travel only in straight lines. So when the spaceship goes to the other side, the radiation does not reach the earth. So the contact is lost.

Nuclear Physics

Elements : The basic constituents of matter in the universe. All matter is made of different combinations of these elements. There are 92 natural elements and a few artificial (man-made) elements. According to the latest reports the total number of elements discovered has gone up to 106.

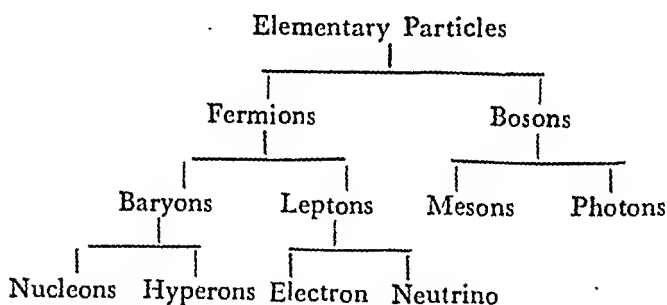
Compounds : The different fixed combinations of elements. There are millions of chemically distinguishable compounds.

Atom : The smallest particle of an element which can exist independently. For all chemical purposes, an atom is the smallest indivisible unit of matter.

Molecule : The smallest quantity of compound that can exist independently. Atoms of certain elements do not remain separately, but remain only in combinations of two atoms. They are called diatomic molecules.

Atomic Structure : The configuration of different components or particles in an atom. An atom consists of a nucleus around which particles, called electrons, are revolving in orbits. Since the nucleus and electrons occupy very little space, there is vast vacuum or empty space, within an atom. The radius of an atom is in the order of 10^{-10} Metres.

Elementary Particles : The sub-atomic particles of various kinds. The different particles are characterised by such attributes as electric charge, life-time, spin, strangeness, mass etc. The classes of elementary particles are shown in the diagram below :



Electron : The most stable elementary particle in the universe. An essential component of an atom. Its mass is $\frac{1}{1836}$ th of the mass of hydrogen atom. It has a negative charge. Electron is a particle which has got wave properties also. So it has dual nature of particle-wave.

Proton : The elementary particle that is found in the nuclei of atoms. The hydrogen nucleus consists of a single proton only. It has a mass, 1836 times that of electron. It has a positive charge equal in magnitude to the negative electric charge of the electron.

Neutron : Another elementary particle which is a constituent of atomic nuclei. Neutron is found in all atomic

nuclei except the nucleus of normal hydrogen. The mass of neutron is slightly more than that of proton. It has no electric charge.

Mass Number : The mass number of an atom is the number of nucleons (particles in the nucleus). $\text{Mass number} = \text{number of protons} + \text{number of neutrons}$.

Atomic Number : The number of electrons in the orbits of an atom or the number of protons in the nucleus. The equality in number between electrons and protons ensures that all atoms are electrically neutral. All chemical properties of an atom depend only on atomic number. The atomic number of hydrogen is 1 and the atomic number of other elements go on increasing by 1, till we reach Uranium which has atomic number 92. The elements in a Periodic Table are arranged in the ascending order of atomic number.

Atomic Weight : The relative atomic mass. Since the mass of an atom is very small, the weights of atoms are assessed only relatively. $1/12$ th of the mass of an atom of an isotope of Carbon ($^{12}\text{C}_6$) is taken as unit. In this scale the atom of ordinary hydrogen will have the atomic weight 1.008.

Isotope : In the case of many elements, there are different forms depending on the number of neutrons in the nuclei. All of them will have the same number of protons in the nuclei (and hence the same atomic number) but different number of neutrons. They are called isotopes of the same element, e.g., ordinary hydrogen has only one proton in the nucleus. The proton and a neutron are found in the nucleus of a hydrogen atom, is called heavy hydrogen (deuterium). The chemical properties of ordinary hydrogen and heavy hydrogen will be the same but a deuterium atom will be having twice the mass of an ordinary hydrogen. The existence of isotopes accounts for the fractional values of atomic weights of different elements. While calculating the atomic weight of an element, the relative abundance of different isotopes will come into consideration and taken into account.

Ion : An electrically charged atom. If the number of protons is more or less than the number of electrons, the atom becomes an ion.

atom, it becomes an ion. This happens because some electrons are lost or gained by the atom. Positive ions (Cations) has a positive charge because electrons are less. Negative ions (Anions) have negative charge because electrons are more than protons. A proton itself is considered a hydrogen ion. Cations attract negatively-charged particles ; anions attract positively-charged particles.

Mass-Energy relation : $E=mc^2$. Einstein's formula gives the quantity of energy 'E' which will be released by the destruction of mass 'm' 'c' is the velocity of light. Thus a large quantity of energy will be available by destroying a small quantity of mass. Since mass of an atom is concentrated in the nucleus, when the nucleus of an atom is disturbed and partially destroyed, large quantities of energy can be released.

Mass Defect : The difference between the mass of a nucleus and the sum of the masses of its constituent nucleons. This mass defect is accounted for by the binding energy in a nucleus. Conversely if the nucleons in a nucleus are to be separated, the binding energy will have to be supplied or used.

Nuclear Cohesive Forces : In the nucleus of an atom there are said to be two fundamental forces of nature, i.e. nuclear strong force and nuclear weak force. Nuclear strong force is responsible for the cohesion in the nucleus. These forces enable the particles in a nucleus to overcome electrostatic repulsion between similarly charged particles i.e., protons. The nuclear strong forces, also called exchange forces, act through a class of elementary particles in the nucleus known as *Mesons*. The weak nuclear forces result from the decay of neutrons.

Mesons : Extremely unstable elementary particles in the nucleus of an atom. They are of several kinds, some positive, some negative and others neutral. Their masses vary between the mass of electron and the mass of proton. Because of mesons the nucleus of a heavy atom is in a state of flux. Mesons are responsible for maintaining the cohesion in an

atomic nucleus and also for causing radioactivity in heavy nuclei.

Radioactivity : An element is said to be radioactive if it is in the process of disintegrating into next lighter elements and in the process emits radiant energy. The product radioactivity are alpha rays, beta rays and gamma rays. Radioactivity occurs in heavier elements only. As the size of the nucleus increases, say beyond 40 Nucleus. the cohesive strong forces are not able to overcome the electrostatic repulsion between distantly-placed protons in the nucleus. Thus the nuclei of heavy elements are not so rigidly bound as in the case of lighter elements. When the instability in the nucleus increases very much, some of the nucleons are thrown out of the nucleus.

Alpha Rays : Streams of helium nuclei i.e. combinations of two protons and two neutrons, which are thrown out at high speed from a radioactive substance. Later when they collide with and capture stray electrons, they turn into helium atoms. In the strict sense, alpha rays are not radiations but particles.

Beta Rays : Beams of electrons which are thrown out at enormous speed. Since these electrons come from the nucleus of the atom where they are not supposed to be found, their occurrence during radioactivity is explained now in terms of neutrinoes. When a neutron, in the nucleus changes into a proton through the action of mesons, neutrinoes and electrons are emitted.

Gamma Rays : Gamma rays are electro-magnetic radiations. Caused because of disturbances in the nucleus. They are part of the electro-magnetic spectrum.

Neutrino : An elementary particle which has no charge and no rest mass, but has the ability to carry energy. They are extremely difficult to detect because of these properties. The same properties are responsible for the extremely high penetrating capacity of the neutrinoes.

Natural Radioactivity : The radioactivity that occurs in nature. All natural radioactive elements fall into one of the three series i.e. Uranium (92), Protoactinium (91)

Thorium (90). All these radioactive elements finally turn into lead (82). Radium and Radon are intermediary stages in natural radioactivity, also called natural transmutation of elements. Radioactivity is totally unaffected by chemical reaction, temperature or pressure.

Half-Life Period : The time taken for a heap of radioactive isotope to decay to the next lighter element by half of its original mass. During this period, half of the atoms in the heap disintegrate. Half-life period may vary from millionth of a second to more than millions of years. The half-life period of uranium is 4,500 million years.

Transuranic Elements : Elements having atomic number higher than 92, in the Periodic Table. They do not occur in nature and are highly radioactive. They can be obtained only through nuclear reactions. Most of them are unstable. The most important of the transuranic elements is plutonium (94) which has half-life period of 24000 years, and hence is relative stable. It is used for nuclear fission.

Fermions : The class of particles that satisfy Fermi-Dirac statistics.

Bosons : The class of elementary particles that satisfy Bose-Einstein equations.

Photon : The basic quantum of electro-magnetic radiations. There are different quanta i.e. photons. Photon has zero rest mass, but definite quantum of energy. Photon exhibits some of the characteristics of particles and hence may be considered as a particle-wave.

Hyperons : A class of unstable particles which decay into nucleons.

Anti-Particle : Every elementary particle has a corresponding real or hypothetical anti particle of equal mass and spin, but opposite charge. Electrically neutral particles have anti-particles, different from them in some other property. The basic proposition is : when a particle and its anti-particle come into contact, they annihilate each other and energy is released. E.g., anti-proton, anti-neutron, anti-neutrino etc.

Positron : The anti-particle of electron. Produced during several decay processes. It is a stable particle.

Anti-matter : Hypothetical matter composed of anti-particles. The basic proposition is : when matter comes into contact with anti-matter, they annihilate each other and energy is released.

Quark : The name given to the sub-particle constituents of elementary particles. It is theoretically held that each elementary particle is made up of different combinations of three kinds of quarks.

Tachyon : A hypothetical elementary particle which travels faster than light. According to the theory of relativity a particle cannot travel at a speed higher than the speed of light unless it has imaginary rest mass or energy.

Electromagnetic Radiation : Radiation in the form of waves of energy. It is associated with electric and magnetic fields which are at right angles to each other and to the direction of propagation. Electromagnetic waves are transverse waves. The peculiarity of electromagnetic radiation is that the waves do not require any medium for propagation. Any transverse wave is characterised by amplitude and wave-length. Amplitude is a measure of the energy content of the wave. The frequency of a wave is given by the simple formula :

$$\text{Frequency} = \frac{\text{Velocity}}{\text{Wave-length}}$$

The unit or measurement for frequency is Hertz. The higher the frequency, the more the energy of the waves. The velocity of electromagnetic radiation is the same as that of light i.e. 3,00,000 Km per second. Electromagnetic radiation occurs in the form of basic quanta of energy called photons.

Electromagnetic Spectrum : Electromagnetic radiation occurs in a wide range of frequencies varying from radio waves to cosmic rays. The total variation in wavelength is from 10^7 to 10^{-15} Cm.

Radio Waves : A band in the electromagnetic spectrum, having the lowest frequencies and the longest wavelengths and hence least energies. The broadcasting stations produce radio

waves by an ordinary electric current. The different frequencies of radio waves are (from the bottom): audio frequencies, low frequencies (long waves), medium frequencies (medium waves), high frequencies (short waves), very high frequencies and radar frequencies. The radio receiver converts the radio frequency electromagnetic radiation broadcast from the stations into sound waves by modulation. Short waves are more energetic than medium waves and hence we are able to hear better short wave broadcasts.

Radar : Radio Direction and Ranging. The apparatus makes use of micro waves for the purpose of locating or guiding moving objects like ships, aircrafts, missiles and artificial satellites. The beam of radiation through radar frequencies has got the property of travelling longer distances than light in the atmosphere, fog or in dark. The rays are reflected back by the solid objects in its path. The reflected rays are received by the radar which acts as the receiver also. The direction and distance of the object are calculated.

Infra-red Radiation : Also known as heat radiation. Emanates from hot bodies. Vibrations and rotations of atomic particles cause infra-red radiations. This radiation has the peculiar property of penetrating fog or haze which would otherwise scatter visible light. So infra-red radiation is used to take photographs in fog.

Light : Light is a band in the electromagnetic spectrum. Its wavelength range from the red (6.5×10^{-7} cm) to the violet (4.1×10^{-7} cm). Different colours have their position in between red and violet. Each colour characterised by a particular wavelength and a frequency. The colour of a body is dependent on the composition of the body and the nature of atoms of which it is made. A non-emitter of light i.e. an ordinary object appears to have a colour because it absorbs electromagnetic radiations of all other frequencies except those of a particular frequency i.e., its own colour. Light is emitted from a source because an electron jumps from the outermost orbit to an inner orbit. When light is absorbed by an object the electron from the inner orbit jumps to the outermost orbit, thereby keeping the object in a state of excitement.

Ultra-violet Radiation : This band of electromagnetic spectrum is more energetic than light. Produced by the orbital electrons in the atom. The same way as light is produced. In nature the main source of ultra violet radiation is the rays of the sun. In the mercury vapour lamp it may be produced artificially. The ultra-violet rays of the sun are useful for mankind in two ways. They ionise the upper layers of atmosphere so that the reflection of radio broadcasting through sky-waves is achieved. Secondly the animal bodies are able to produce vitamin D only in the presence of the ultra violet rays. Too much of ultra violet radiation may cause sun-burn.

X-Rays : The band of electromagnetic spectrum which is emitted when the inner orbital electrons of an atom are disturbed. X-rays can be produced when a stream of electrons strike a material object. The important property of X-rays is its capacity of penetration into matter which will be normally opaque to ordinary light. The other property of X-rays is fluorescence. X-rays cause fluorescence in certain substances. The third effect of X-rays is ionisation. Ionising radiations are harmful to living organism in larger doses. But in smaller doses they can be used for destruction of germs and for irradiation of foodstuff. X-ray radiation may also cause mutation of genes. The practical applications of X-rays are in scientific, industrial and medical fields. In the scientific field it may be used for observing the crystal patterns and for study of certain proteins. The industrial uses of X-rays include testing of artificial pearls, analysis of alloys and study of structures of cellulose, rubber, fibre-plastic etc. In the medical field X-rays are used for radiography and X-ray therapy. Radiography enables diagnosis of disease such as tuberculosis, stones in kidneys, ulcers in intestines etc., through barium meal. X-ray therapy has been applied to cancer in the initial stages.

Gamma Rays : A band of electromagnetic spectrum emitted from the nuclei of the atoms during natural and artificial radioactivity and during other types of nuclear disturbances. They have properties similar to those of X-rays, but with more energy and penetrating power.

nuclear reactor is found at Rana Pratap Sagar Atomic Power Plant and Kalpakkam Atomic Power Plant. A new type of nuclear fuel that has been fabricated in India is MOX (Mixed Oxide) fuel consisting of a mixture of uranium oxide and plutonium oxide. It may replace enriched uranium.

Power Reactor : A nuclear reactor that is meant to convert the nuclear energy released through nuclear fission into electrical energy. All Indian nuclear reactors are all power reactors.

Production Reactor : Also called Breeder Reactor. The nuclear reactor which is used to produce more fissile materials through the nuclear chain reactions in the reactor. It produces in larger quantities the same kind of fissile material which it burns, e.g., reactor using plutonium as fuel can produce more plutonium than it uses by conversion of U_{238} into plutonium.

Propulsion Reactor : The third type of use of nuclear energy is seen in this reactor which converts the released nuclear energy into mechanical energy for the propulsion of engines. Used in submarines, rockets and aeroplanes.

Fission Products : The end products of a nuclear reaction. When a nuclear fission occurs the end products are not always the same. The fission products are harmful to the progress of reaction and hence have to be removed from the reactor. One important product which accrues in small quantities is plutonium which is very valuable and is generally subjected to strict international safeguards. The by products are collected from the reactor at regular intervals.

Nuclear Fusions : When two light atomic nuclei come into contact under certain conditions, a heavier nucleus may be formed and energy may be released in the process. The nuclear fusion process known to occur in nature is the formation of a helium nucleus from two hydrogen nuclei in a series of reactions. The two important conditions for the occurrence of fusion reaction are extremely high temperature and plasma state of matter. Because fusion is accompanied by extremely high temperatures, this reaction is also called thermo-nuclear reaction. In nature such high

temperatures are found only in the core of the sun and stars and hence nuclear fusion reactions are continuously taking place there. The high temperature of the order of 2 million $^{\circ}\text{C}$ can be produced artificially only through a nuclear fission explosion. This is why a hydrogen bomb using nuclear fusion will operate only along with an atom bomb. The energy produced during fusion process is much more than during fission. Besides there is no limit to the amount of energy than can be produced through fusion. In addition fusion requires only abundantly available materials like hydrogen, unlike fission which requires costly and rare minerals like thorium, uranium etc.

Nuclear Fusion Reactor : Attempts are being made in the world to construct a nuclear fusion reactor which will successfully harness the fusion energy. The difficulties relate to the creation of extremely high temperatures in closed space. If controlled thermo-nuclear reactions are achieved, unlimited quantities of energy would be available to humanity.

Plasma State : The fourth state of matter. The state to which the gas is changed under certain conditions. The molecules in this state exist in the form of positive and negative ions. The number of positive ions is approximately equal to the number of negative ions so that matter appears to be electrically neutral like ordinary gas ; but because it is full of charge, the medium becomes highly conducting. Artificially, plasma state can be produced only under very high temperatures.

Particle Accelerator : An apparatus used to accelerate elementary particles. Particles can be accelerated to acquire very high speeds by imparting large quantities of energies to them. Particles accelerators may be cyclic or linear.

Cyclotron : A particle accelerator in which charged particles are made to move in a suitable magnetic field. The particles generally move in ever increasing circles. Nowadays variable energy cyclotrons are also available. Different other particle accelerators are Betatrons (electrons), Bevatron (protons and other particles) and Synchrotrons.

Nuclear fall out : The effects of a nuclear explosion on the atmosphere consists of radioactive substances deposited on the surface of the earth from the atmosphere. Three types of fall-outs are associated with a nuclear explosion—local fall-out, Tropospheric fall-out and Stratospheric fall-out. The local fall-out is felt within a radius of 150 kms during the first few hours. Tropospheric fall-out is felt around the same latitude within a week. Stratospheric fall-out spreads over the whole world over a period of years.

Astronomy and Space Research

Astronomy is the science which studies the origin and nature of the universe, galaxies, stars, solar system and planets. Since ancient times astronomy has been pursued as a study of the sky and the phenomena observed in the sky. Scientific study of astronomical matters in the past was handicapped by lack of the basic technique i.e., experimentation. In matters relating to space and the stars no experiments were possible. Observation and theorization were the only methods through which astronomy could be built as science. However, more and better instruments for observation have been developed since Galileo invented the telescope. During the 20th Century further advances have been possible because man is able to undertake space voyages and artificial satellite can be kept in space.

Solar System

Since ancient times solar system has been the matter of study by astronomers. The existence of many planets which are related to the sun and are different from other stars was known to many ancient astronomers. The members of the solar system are the sun, planets satellites, comets, asteroids and meteors.

Sun

Sun is the centre of the solar system and the only source of energy. It is a typical star of average size, mass and brightness. We are able to see the sun as a glowing ball because it is at a distance of only 15 crore Km from the earth. By measuring the amount of radiation incident on earth from the sun we are able to calculate the surface temperature of the sun.

the sun at around 5800°K . Since no material can exist in solid or liquid form at this temperature, the entire matter in the sun is gaseous. The temperature of the sun goes on increasing from surface towards the centre. The temperature at the core of the sun may be around $14,000,000^{\circ}\text{K}$. Hydrogen accounts for 70% of the mass of the sun, helium 28% and all other heavy elements only 2%. The mean density of the sun is 1.4 gm/c.c. but the density of the sun increases sharply from the surface to the core. The energy production of the sun takes place at the core through the process called thermo-nuclear reaction. Two kinds of thermo-nuclear reactions in the sun are based on carbon-nitrogen cycle and proton-proton chain reaction. In both types, four hydrogen nuclei fuse to form a helium nucleus.

Photographs of the sun show dark spots on the surface of the sun. These are called sunspots. They are characterised by somewhat lower temperature compared to the surrounding areas and have intense magnetic fields. The number of sunspots vary from year to year in a periodic cycle of eleven years known as sunspot cycle. The period of rotation of the sun about its axis is twenty-five days. The phenomenon of *solar flare* occurs on the sun at irregular intervals. During the solar flare, the sun emits streams of protons, electrons, and alpha particles which reach the earth after a day causing magnetic storms and other radio disturbances. It is noticed that solar flares occur more frequently during certain periods of the sunspot cycle. It has been found that even the growth of trees is affected by the sunspot cycle; the thickness of the rings in the trunk of a tree varies according to the sunspot cycle.

Solar wind : in another phenomena connected with the sun. Continuous streams of protons blowing out of the corona and extending over the entire solar system go by the name solar wind. It has been found that a solar wind is in the state of plasma i.e., ionised gas. The solar winds are responsible for distorting the shape of the magnetosphere of the earth. The terrestrial phenomena of *Aurora Borealis* and *Aurora Australis* are the results of sunspot activities and

solar flares. These Auroras are seen as multi-coloured band of light across the sky in the Arctic and Antarctic regions.

Analysing the structure of the sun we find the central gaseous matter known as a *photosphere*. This is the glowing part of the sun. It is surrounded by *chromosphere*, extending to several thousand kilometres. This portion generally emits red light. The atmosphere of the sun i.e., the rarified layers near the surface of the sun go by the name *corona* which is clearly visible as a ring of light during solar eclipses.

Planets

Now so much is known about the nature and properties of many of the planets that each planet may be discussed independently. All the planets revolve round the sun, each in its elliptical orbit. The peculiarities associated with each of the planet are particularly worth noting. Some important data about the planets are given in the table below.

Mercury: is the smallest (in mass and volume) of the planets in the solar system. It takes the same period of 176 days to complete two revolutions around the sun and three rotations about its axis. This has led to the mistaken view that its period of rotation is the same as the period of revolution. Since Mercury is very close to the sun, closer observation of this planet which is reasonably near the earth has not been possible. It may be seen as an evening star just after sunset or as morning star just before dawn.

Venus: This is the planet closest to the earth and hence seen as brightest. This is the planet often known as morning star and evening star. It has the peculiarity of retrograde rotation which is very slow. It is the only planet with such a slow rate of rotation that it does not complete one rotation about its axis within the period it takes for completing a revolution around the sun. Venus is known for its ~~hot and~~ atmosphere. Because of this the temperature ~~is~~ during day and night remain almost the same.

Table

Body	Period of revolution in years	*Distance from sun	*Radius	Rotation period	*Mass	Mean density (Kg/m ³ 10 ⁻³)
Moon	—	—	—	—	—	—
Mercury	0.241	0.387	0.27	27 days	0.0123	3.34
Venus	0.615	0.723	0.38	58 days	0.056	5.4
Earth	1.000	1.000	0.96	243 days	0.815	5.1
Mars	1.881	1.524	1.00	24 hours	1.000	5.52
Ceres (Largest Asteroid)	4.603	—	0.53	24 hours	0.107	3.97
Jupiter	11.864	2.767	—	—	—	—
Saturn	29.46	5.203	0.055	90 hours	0.0001	3.34
Uranus	84.01	9.540	11.23	10 hours	317.9	1.33
Neptune	164.1	19.18	9.41	10 hours	95.2	0.70
Pluto	247	30.07	3.98	11 hours	14.6	1.33
		39.44	3.88	15 hours	17.2	1.66
		—	0.5	6 hours	0.11	4.9

*Distance - radius and mass with Earth as unit.

Premier Competition Man

winds in the atmosphere make the temperatures during day and night nearly the same. The thick atmosphere gives rise to "Green House effect". The sun light which goes into the atmosphere is trapped as if in a furnace and is not allowed to escape into space. The atmosphere of Venus consists mainly (90%) of carbon dioxide and its pressure on the surface is 100 times that on earth. However, the top layers of the atmosphere have a very low temperature near 0°C which enable the formation of clouds of ice (mainly of carbon dioxide).

Mars : Known as the red planet, because it is seen red from the earth. Although much smaller in size compared to the earth, it has its axis inclined to the plane of the ecliptic similar to the earth as a result of which its poles have ice caps as an earth. In its orbit it comes periodically very close to the earth. Martian surface has features very similar to the earth with volcanoes, canyons, canyons, uplifts and faults. This gave rise to the speculation that life could exist on Mars. However Viking Missions have provided to clear proof of existence of any microorganisms in the planet. Evidence of organic molecules and other compounds of carbon is not available. Though rivers might have been there at one time, at present no water is found.

Jupiter : Jupiter is the first of the outer planets and the giant among the planets. 71% of the total mass of the planetary system is concentrated in Jupiter. It is known to radiate away more energy than it receives from the sun. From the earth it is the most powerful radio object in the sky next to the sun. The planet has a powerful magnetic field and radiation belts. Not much is known about the surface of Jupiter except that it may consist entirely of liquid hydrogen without any solid area. It has an atmosphere, 40,000 km thick. It consists of hydrogen and helium along with methane and ammonia. The most striking feature of Jupiter's surface is the Great Red Spot which was studied in depth by Pioneer 10 and Voyagers I and II.

Saturn : This the outer most planet of the solar system visible to the naked eye. The peculiar feature of Saturn is its

system of rings. Nowadays the rings are divided into four bands with smaller rings interspersed between them. The data and pictures sent by Voyagers I and II regarding Saturn are still being studied. Pioneer 11 is the first spacecraft that flew past Saturn and its satellite, Titan.

Uranus : Discovered in 1781, it is another planet of the solar system having retrograde rotation. Very recently (in 1977) rings have been discovered around Uranus. The planet's surface is supposed to consist of liquid methane. Another peculiarity of Uranus is that its axis is very near to the plane of orbit so that it practically rolls on its sides as it revolves round the sun. Voyager II is now on its way to Uranus.

Neptune : Discovered in 1846, Neptune is a planet without any striking peculiarities. Only when Voyager II throws light on the planet by the end of this decade, more details about the planet will be available.

Pluto : The outermost planet of the solar system known so far. Discovered in 1930, the striking feature of Pluto is its high eccentricity with an elliptical orbit between 7 billion km and 4.5 billion km. Because of this its orbit cuts the near-circular orbit of Neptune. This results in the peculiar phenomenon that for a certain period Pluto will be nearer to earth than Neptune. (This is the case from 1977 to 1999).

Planetary System : Planets from Mercury to Mars are known as Inner planets since they are within the asteroid belt. Earth is an Inner Planet. The remaining planets are Outer Planets.

Satellite

The satellites in the solar system are celestial bodies which revolve round the planets. The number of satellites of the different planets are as follows: Mercury (0); Venus (0); Earth (1); Mars (2); Jupiter (16); Saturn (21); Uranus (6); Neptune (2) and Pluto (1). It is worth noting that a large number of satellites of Jupiter, Saturn and the other Outer Planets have been discovered only very recently. Most of the satellites are tiny compared to the earth's satellite, Moon.

Moon : The only satellite of the earth which is at a distance of about 4 lakh km from the earth. Moon's diameter is about one-fourth of that of the earth and density about 3 gm/cc so that the mass of the moon is about 1% that of the earth. Moon is the biggest satellite of the solar system ; still its gravitational attraction is $1/6$ g. So a man will expend much less energy for walking on the moon than on the earth. The surface temperature of the moon varies widely from 110°C during day to -150°C during night. It has no atmosphere because its mass is too low to sustain atmosphere. The period of rotation of the moon is exactly equal to its period of revolution round the sun i.e., 27 days. Because of this we are not be able to see nearly half of the surface of the moon. The other side of the moon was seen for the first time only when space voyage was undertaken by an artificial satellite. Moon's surface consists of mountains, highlands and craters as on earth. Since the gravitation of attraction of the moon is low there is no atmosphere on the moon. Because of this there is no twilight. The samples of moon rock have been brought to earth through the space voyages undertaken to the moon. The main speciality of the moon rocks was the higher percentage of titanium found in them. There is no water or life on the moon.

of a few kilometres. As it approaches the earth, the head expands to a few thousand kilometres. The most interesting part of a Comet is the tail which it develops as it comes closer to the sun. The tail always points away from the sun due to the solar wind. Some of the comets break into pieces when they approach the sun and fall as meteor, showers on earth. The comets have all types of orbits-elliptic, parabolic and hyperbolic. The comets having highly elliptical orbits return near the sun and the earth periodically whereas comets with the other two types of orbits disappear into space after going round the sun once. The periodicity of the comets with elliptical orbits may vary from a few years (the lowest 3 years) to million of years. The number of comets has been estimated in several thousands of them only. A few are quite prominent because of their size. The important periodic comets are Halley's Comet which is due to appear in 1987 (period 76 years) the Great Comet of 1811 and Kohoutek discovered in 1975.

Meteors

Small pieces of solid matter which are found scattered in the inter-planetary space of the solar system are known as meteoroids. Some of them get attracted by the earth, the planets and the satellites. When they descend into the atmosphere, they get heated up and burn. This phenomenon is known as meteor (shooting star). Meteors have been responsible for the formation of the craters on the surface of the earth and other planets and satellites. The craters are formed when a big meteor gets embedded into the surface.

Study of the Universe

Concepts like space and time have undergone drastic changes in the context of the latest scientific developments. According to Einstein's Theory of Relativity there is space-time continuum as a result of which the convertibility of one into the other is there. Regarding the extent of space and time, speculation has been there from time immemorial. Science has not yet succeeded in finally deciding about whether space and time are finite or infinite.

Study of univers has undergone tremendous change since the days of Ptolemy who postulated that earth was the centre of the universe and all heavenly bodies including the sun revolved round it. In the 16th Century Copernicus outlined his heliocentric theory of the universe. According to it the sun was the centre of the universe and earth was a planet revolving round it. Kepler's three laws of planetary motion established on a firm footing views about the motions in the solar system. Kepler's laws were finally theoretically confirmed by Newton who derived them from his own law as of motion and his law of universal gravitation.

Newton's universal law of gravitation : Every body in this universe attracts every other body with a force, directly proportional to the product of their masses and inversely proportional to the square of the distance between them.

Although the existence of the milky way in the celestial sphere had been noted long back, it was only Hubble who pointed out in 1925 for the first time that ours was not the only galaxy in the universe and that the sun was not the centre of the galaxy. Improved equipments and instruments have helped astronomers in their observation and theory. Starting with the simple refractor telescope devised by Galileo in 1609, a host of equipments have been fabricated for astronomical observation and study. Refractor telescope makes use of a set of lenses to magnify and view distant objects. Reflector telescope makes use of a large curved mirror for the study of sky. Large-sized refractor and reflector telescopes are today in operation in big observatories. Radio astronomy was ushered in 1950 with the installation of radio telescope at Jodrell Bank, U.S.A The radio telescope make a use of any band of electromagnetic spectrum, instead of light as in optical telescopes. Depending on the band of electromagnetic spectrum we have X-ray astronomy ultra-violet astronomy, and radio astronomy.

Theories of origin of universe : Different theories evolved in modern times regarding the origin of the universe that billions of years ago the universe started with a bang of a primal ball of matter. The explosion

sun remain single. The binary stars revolve round a common centre of gravity. Many bright and faint stars together form groups called constallation. From very ancient period different constellations have been recognized been reconized by astronomers in different countries. However, modern astronomers have divided the sky into 88 constellations. Nowadays more is known about the physical properties of stars through the study of stellar spectra. The emission of continuous spectrum and formation of absorption lines in stellar spectra enable us to fix many properties of stars such as temperature, chemical composition, radius, mass etc. It has been found that 88% of atoms in the universe are hydrogen and 11.8% helium; only 0.2% are the remaining heavier elements. Depending on size, stars are called super giants, giants, dwarfs and white dwarfs. Sun is a dwarf. The masses of stars range from about forty times the mass of the sun for the hottest stars to one-tenth of the solar mass for the coolest. In general it is found that the luminosity of a star increases with mass according to $3\frac{1}{4}$ th power of mass. Depending on the temperature at the surface, stars have colours ranging from red (smallest), orange, yellow, blue, blue-white, and white (hottest). Magnitudes are assigned to stars according to their brightness as observed from the earth. The apparent brightness of a star is proportional to its absolute brightness and its distance from the earth. The successive magnitudes are $2\frac{1}{2}$ times the preceding magnitudes.

Birth of Stars : All stars have been formed at different times since the birth of the universe, by the action of the inter-gravitational attraction of the cluster of matter called stellar gas or dust. As the matter in a proto-star condenses, the peripheral matter tends to fall towards the centre with increasing speed. This heats up and ignites the core and, as a result, emission of heat and light starts. When this process has gone on for millions of years the nuclear fusion reactions at the core start. Thus the star is born. The lifetime of star is dependent on its mass. It is worth noting that stars are still being born in the universe. The sun is supposed to have been born about 4 billion years ago.

Death of stars : The process of death of a star starts when the hydrogen in its core runs out and nuclear fusion reactions die down. At this stage the pressure inside the core falls and as a result, the star begins to contract and becomes hot in the process. The intense radiation pressure blows up the matter and enlarges the size of the star enormously. At the core, fusion of helium to form carbon and oxygen occurs releasing energy in the process. But this comes to an end after some time. Thereafter fusion of carbon and oxygen atoms to form heavier elements occurs and goes on still elements of the iron group are formed. The iron group elements are the most stable ones and hence do not undergo fusion reaction to produce energy. Thereafter the core of the star can only collapse. The collapsing core imparts a very high temperature to the surface and induces fusion reaction of hydrogen into helium at the surface. It is this sudden infusion of energy which causes a *super novo* explosion accompanied by increasing of luminosity many thousand times. The contracting core now ends up as a white dwarf or a neutron star or a black hole depending on the initial mass.

White Dwarf : It is Nobel Laureate S. Chandrasekhar who worked out the process of death of a white dwarf. All stars having mass less than 2 solar masses (twice the mass of the sun) end as white dwarfs. After the Nova explosion, a white dwarf cannot have a mass more than 1.4 solar masses. This limiting mass was worked out by Mr. Chandrasekhar and is known as Chandrasekhar limit. The mechanism of formation of a white dwarf is simple. Once there is no nuclear fuel left in the core, the matter contracts and cools off. Still the high surface temperature and luminosity will continue for millions of years generating heat and light. Eventually it will cool down into a black dwarf with no heat or light but with heavily condensed matter.

Neutron star : A star whose mass is between 2 and 5 solar masses will ultimately turn in to a neutron star or pulsar. Such stars are called Neutron stars since the matter in the core will finally consist of neutrons only. Consequently th

of matter in a neutron star will be billion times more than in a white dwarf. Since the collapse and contraction of a neutron star occurs suddenly, the outer surface will experience an explosion and in the core matter will be raised very much in temperature. This matter gives out pulses with extremely regular frequency in the range of radio waves.

Black Hole : Stars which have masses more than 5 solar masses will end as black holes. The core of a black hole is so dense and the gravitational attraction so strong that even electromagnetic radiation cannot escape from it. So it may not be seen by optical or radio telescopes. The presence of a black hole near Cygnus XI has been detected because of the impact of the black hole on this binary star. A black hole swallows all matter around it and nothing is allowed to escape from it.

Space Travel

The first artificial spaceship, Sputnik, was sent into space by the USSR on 4 October 1957. Since then numerous spacecrafts and satellites have been launched into space. The USSR also put the first man Yuri Gagarin into space in 1961. Space travel has been undertaken for a variety of reasons. The basic scientific purpose is knowing better and more about the space, universe and related matters. Space travel is unquestionably an adventure and a challenge to human spirit. The competition among countries in establishing their superiority over others is another motive factor. The applications of space travel and technology are meteorological observations, remote sensing of the earth, telecommunication, undertaking different experiments and operations in space etc. Space travel also has military applications including spying operations.

Space Voyages round the earth : USSR ; USA ; European Space Research Organisation including France, Britain and Germany ; Japan ; China and India have so far undertaken space venture in the form of space launch vehicles, satellites and human travel. In the case of USSR, the most notable and currently relevant items of space voyage round the earth

relate to the *Salyut and Soyuz* series. Salyut is a permanent space laboratory which has been orbiting the earth since 1971. The present number is Salyut-6, launched in 1977. (Earlier Salyuts have disintegrated or become non-functional.) Soyuz spaceships which periodically visit the space, get docked to Salyut and, after conducting numerous experiment, return to the earth. The American and Russian space voyages round the earth are mainly meant to test and enhance the endurance of human beings in space and to carry out more and more sophisticated manoeuvres and experiments in space. The USA does not have any permanent space laboratory orbiting in space since the disintegration of the skylab which was launched in 1973 and became non-functional in 1974. However, it has launched a more spectacular programme of Space Transport System (STS) with its space shuttles, *Columbia* and *Challenger*. These two shuttles have been going into and returning from space since 1981. After 4 flights of Columbia in 1981 and 1982, Challenger took over. Shuttle flights are fundamentally superior to the other space flights since these spacecrafts are reusable and land on earth as an aircraft.

Kinds of Space Probes: The different kinds of space travel undertaken are the following : (1) Sending a spaceship to pass near a planet or satellite in order to make observations of the celestial body from a distance. Fly-bys were sent to moon in the initial stages of space travel. So far only fly-bys have been attempted with regard to Mercury (Mariner-10), Jupiter (Pioneer-11, Voyager I and Voyager (II) and to Saturn, all by the USA. (2) Sending orbiters to go round a planet or satellite in orbits: The spaceship remains in orbit for some time and returns as in the case of the Moon flights or turns into an artificial satellite of the planet and remains in the sky permanently. (3) Atmospheric probes are undertaken by spaceships which descent into the atmosphere of a planet or eject some instrument to descent into the atmosphere. These spaceships use instrmeunts to collect data during their descent and pass on the data to the earth. Generally they perish after descending throu atmosphere. (4) Soft landing of a spacecraft on the

of a planet: In this case crash landing is avoided by controlling the speed of descent of the spaceship till it touches down the surface of the planet or satellite smoothly. The soft-landing spacecraft may carry only instruments and equipments for observation or may take men to the celestial body. Softlanding with men has been successfully attempted only in the case of moon by the USA. In some cases landing spaceship or a module from it collects samples or moves over the surface of the planet, exploring larger areas. (5) More sophisticated spaceships can take off from the planet or satellite and return to the earth. Such sophisticated journeys have been undertaken only in the case of moon.

Memorable Space Voyages: Armstrong and Aldrin of USA, landed on the moon in 1969 (Apollo 11). Since 1974 no space voyages have been undertaken to the moon by USA or USSR. Viking Missions I and II were successfully launched by the USA in 1975 and have provided valuable information regarding Mars. periodic space-probes (Venera series) are sent by USSR to Venus. While soviet probes have been confined to Venus, Mars and moon, the U.S.A. has covered all the planets of the solar system excluding Pluto. The most spectacular performance till then was put up by Pioneer 10 which was launched by USA in 1972, flew by Jupiter in 1973 and finally left the solar system in 1983, all the time maintaining {communication with the earth. Pioneer 11 passed by Jupiter and saturn and gave the first close-up pictures of Saturn and its satellites. Voyager I and II were launched by USA in 1977. Both passed by Jupiter and Saturn and transmitted a large number of close-up pictures of these two planets before they started their long journey into outer space. Voyager II is scheduled to pass by Uranus and Neptune also.

Indian Space Technology

India started its space programme in 1963 and entered the space age in 1975 by placing in orbit the first Indian satellite, Aryabhata. Another major landmark in the space history of India was the successful launching of SLV-3 since 1979.

Sounding (Sonde) rockets have been launched from Thumba Equatorial Rocket Launching Station since 1963. These experiments have been performed in collaboration with many advanced countries. India has constructed a number of satellites, Aryabhata, Bhaskaras, Rohinis, and APPLE among them. India has established Shriharikota High Altitudes Range (SHAR) for launching multi-stage rockets and satellite launch vehicles. The important space programmes of India are the following :

Aryabhata : Launched from a Soviet Cosmodrome, this 350 kg satellite was designed for astronomical experiments and performed very satisfactorily.

Bhaskara I. and II : The remote-sensing satellites fabricated in India and launched from the Soviet Cosmodrome in 1979 and 1981 respectively. They were meant to do remote sensing and to conduct experiments in forestry, hydrology, snow melting, soils, agricultural forecasts and oceanography. These 444-kg satellites in a near circular orbit of about 500 km functioned reasonably well.

SLV-3 : Is the major space launch vehicle programme of India. Started in 1979 and was successful for the first time in 1980. Thereafter two developmental flights were successfully completed so that, after the successful launching of SLV-3D2 on 17 April 1983, Indian rocket launching system has been put on a sound basis and confers on India the intermediate range ballistic missile (IRBM) capability.

Rohini Satellites : Satellites weighing around 40 kg were the payloads of SLV-3 experiments RS-2 which was launched by SLV-3 D2 has functioned very well and the SMART sensor in it has been sending very good images since 1983.

APPLE : India's first experimental telecommunication satellite was launched into space by Ariane rocket of European Space Agency in 1981. This Ariana Passenger Pay-Load Experiment satellite which was fixed in a geo-satationary orbit of 36,000 km above the earth on the equator functioned very well and helped Indian television and telephone facilities for a period of more than 2 years.

INSAT : The Indian National Statellite system is a multipurpose operational system providing telecommunication, television and meteorological observations from a geo- stationary satellite. For this system two satellite *INSAT-1A* and *INSAT. 1B* were bought and launched from the USA. *INSAT-1A* was not very successful because of a problem relating to the solar sail. *INSAT-1B* was launched into space in 1983 and has success- fully overcome the inial problems. It is expected to be in space for a period of six years.

Technology

Inventions and Discoveries

<i>Invention/Discovery</i>	<i>Year</i>	<i>Inventor/Discoverer</i>	<i>Country</i>
Airplane with motor	1903	Orville and Wilbur Wright	USA
Automobile (motor Car)	1885	Benz	Germany
Balloon	1783	Montgolfier Brothers	France
Bicycle	1884	Starley	Britain
Cement (Portland)	1845	Aspdin	Britain
Clock pendulum	1657	Huygens	Holland
Computer (electronic)	1946	Eckert Manchly	Britain
Cyclotron	1930	Lawrence	USA
Diesel engine	1895	Diesel	Germany
Dynamite	1862	Nobel Alfred	Sweden
Dynamo	1831	Faraday	Britain
Electric Battery	1800	Volta	Italy
Electrolysis	1852	Faraday	Britain
Helicopter	1907	Cornce	France
Lamp, incandescent	1879	Edison	USA
Lamp, mercury Vapour	1912	Hewitt	USA
Lamp, miner's safety	1816	Davy	Britain
Laser	1957	Gordon Gould	USA
Machine gun	1861	Gatling	USA
Microscope, compound	1590	Janssen	Holland
Microscope, electron	1931	Knoll-Ruska	Germany

<i>Invention/Discovery</i>	<i>Year</i>	<i>Inventor/Discoverer</i>	<i>Coun</i>
Movie (talking)	1927	Warner Brothers	US
Pen, fountain	1884	Waterman	US
Photography	1826	Niepce	France
Pistol (Revolver)	1835	Colt	US
Printing, colour	1457	Schoeffer	Germany
Radio valve	1904	Fleming	Britain
Radio Broadcasting	1895	Marconi	Italy
Radioactivity	1896	Becquerel	France
Radium	1898	Curies	France
Razor, safety	1895	Gillette	USA
Rocket engine	1929	R.H. Goddard	USA
Sewing machine	1846	Howe	USA
Spinning Jenny	1767	Hargreaves	Britain
Steam engine	1765	James Watt	Britain
Steel	1856	Bessemer	Britain
Steel, Stainless	1916	Brearley	Britain
Tank, military	1914	Swinton	Britain
Telegraph	1837	Morse	USA
Telephone	1876	Graham Bell	USA
Telephone, automatic	1891	Strowger	USA
Telescope (crude)	1608	Lippershey	Netherlands
Telescope	1609	Galileo	Italy
Television	1926	Baird	Britain
Thermometer	1593	Galileo	Italy
Thermometer (Mercury)	1714	Fahrenheit	Germany
Transformer	1831	Faraday	Britain
Transistor	1947	Shockley, Brattain, Bardeen	USA
Tyre, pneumatic	1888	Dunlop	Britain
Typewriter	1868	Sholes	USA
Vacuum flask	1892	Dewar	Britain
Vulcanisation	1884	Goodyear	USA
Ray tube	1916	Coolidge	USA

Measuring Instruments and Scientific Appliances

Altimeter : To measure altitudes.

Ammeter : To measure current strength.

Anemometer : To measure force and speed of wind.

Audiometer : To measure intensity of sound.

Barometer : To measure atmospheric pressure.

Binocular : To see magnified images of distant objects.

Callipers : To measure small distances.

Calorimeter : To measure quantity of heat.

Carburettor : To mix air with petrol vapour in an internal combustion engine

Chronometer : To measure time.

Mariner's Compass : To find out north-south direction at any place.

Fathometer : To measure depth of oceans.

Galvanometer : To measure small currents.

Geiger-Muller Counter : To count the sub-atomic particles in a medium.

Gravimeter : To find out the presence of oil deposits in the sea.

Gyroscope : To illustrate the dynamics of rotating bodies.

Hydrometer : To measure specific gravity of liquids.

Hygrometer : To measure relative humidity in air.

Lactometer : To measure the purity of milk.

Manometer : To calculate the pressure of gases.

Micrometer : To measure very small distance or angles.

Microscope : To view magnified images of minute objects.

Odometer : To measure distance covered by a vehicle.

Phonograph : To reproduce recorded sound.

Phonometer : To compare the luminosity of two different sources of light.

Pipette : A graduated glass tube which is used to take a definite volume of liquid.

Potentiometer : To compare the potential differences (e.m.f.), resistance and current in electrical circuits.

Pyrometer : To measure high temperature from a distance (using the principle of radiation).

Seismograph : To detect and measure the intensity of earthquakes.

Sextant : To measure the altitude of heavenly bodies and distant objects.

Spherometer : To measure curvature of surfaces.

Spectrometer : To measure the refractive indices of different lights

Stereoscope : To get three dimensional images of photograph.

Stop watch : To record small intervals of time.

Telescope : To observe magnified images of distant objects.

Thermometer : To measure temperature.

Thermostat : To measure and regulate temperature, particularly in an electrical circuit.

Viscometer : To measure viscosity of liquids.

Technological Terms

Technology : The science connected with production and use of tools and implements. Technology is a common term applicable to various fields of science. e.g., we have chemical technology relating to production and use of chemicals. Textile technology deals with the manufacture of textiles.

Engineering : The science of production and use of different scientific contrivances. There are different kinds of engineering such as civil, mechanical, electrical, aeronautical etc. The basic difference between engineering and technology lies in the emphasis placed on scientific and theoretical aspects in engineering. Technology mainly emphasizes the method of operation and use of tools.

High Technology : The use of sophisticated and complex equipments and installations. High technology is necessary for certain capital goods industries such as steel, fertilizers etc. defence production, space and nuclear installations, colour television tubes, electronic exchanges etc.

Intermediate Technology : The technology which generally produces finished goods and intermediary products. The scientific and technological aspects of the technology involved are such as can be managed by highly competent scientist and technologists in India. Import is not normally necessary for this technology.

Low Technology : Application and use of scientific devices and instruments for different aspects of production. Generally low technology does not displace labour. This technology can be operated by qualified technicians.

Obsolete Technology : Technology currently used in any field which does not conform to the standard of the technology generally prevalent throughout the world. e.g. primitive technology is definitely obsolete technology anywhere in the world. In course of time most technologies become obsolete compared to the latest technologies.

Appropriate Technology : The technology that is appropriate to the given conditions of production. Appropriateness depends on various factors such as the available resources, power and energy constraints, standard of living, availability of technical know-how and qualified technicians etc.

Working Principles of Scientific Appliances and Machines

Spring Balance : A simple device to measure the weights. The basic principles are the effect of gravity on any body on earth and Hooke's law of elasticity.

Thermos Flask : The working principle is prevention of heat transmission through conduction and radiation. Since glass is a bad conductor, the heat of the substance inside the flask is not passed on to outer surface of the glass. The radiation of heat through the surfaces is prevented because of the polish on the surface.

Cinematography : An apparatus for projecting films on the screen. The main principle employed is persistence of vision. Movie camera photographs on a continuous film at the rate of 16 per second, This sequence of films, if operated through

current passes through the wire surrounding the core. It works on the principle of electromagnetic induction.

Electric Lamp : The basic principle is that when electric current is passed through a very fine filament of tungsten, the filament gets heated up to white heat and glows because of the extreme resistance. The incandescent filament continues to glow because the space inside the glass bulb is total vacuum or is filled with some inert gas such as nitrogen or argon. Energy is transformed from electricity to heat and light.

Electric Bell : A simple device making use of the magnetic effect of an electric current. It consists of a small electromagnet, a hammer attached to a soft iron piece and the bell.

Electric Iron : A coil of nichrome placed between two pieces of mica is the central apparatus. When current passes through the nichrome wire it offers great resistance and thereby produces a lot of heat which is transmitted to mica and, through that, to the iron plate.

Electric Heater Coil : Electric energy is converted into heat energy mainly because of the high resistance of the nichrome coil which is used in it.

Microphone : A device for converting sound waves into electrical energy, which may then be reconverted into sound after transmission by wire or radio waves. There is a diaphragm which reacts to the sound and causes alteration in the resistance of the electrical circuit according to the vibrations of sound.

Loudspeaker (Amplifier) : A device for converting electric current into sound loud enough to be heard at a distance. The common type of loudspeaker has a paper cone which electromagnetically vibrates and produces sound.

Telephone : It consists of two parts, a transmitter and a receiver, connected by an electrical conductor. The transmitter is a carbon microphone and the receiver acts almost like loudspeaker without magnifying the sound. Telephone operates in a closed circuit connected by wires.

Teleprinter : A system of telecommunication which employs a type of writing device at both transmitting and receiving ends.

Tape Recorder : Its main component is the magnetic tape, a plastic tape coated with a ferromagnetic powder. The tape retains a record of the modulations (changes) in the magnetic circuit induced by the current. The tape can be played back to get the same modulation and thereby the same voice.

Gramophone ; It is a device for reproducing recorded sound. It consists of a disc on which the sound record is cut in the form a spiral groove. There is a rotating spindle and a sound box. Nowadays the sound box has been replaced by an electromagnetic system of reproduction.

Airconditioner : The device meant to control the temperature, humidity and circulation of air in an enclosed space e.g. a room, a factory etc. Exhaust machines are used to suck waste and hot gas and to discharge it to outside. The air inside gets purified and reduced in temperature. An airconditioner can be set to maintain a particular temperature, even a high temperature compared to the surroundings. This makes it very much different from air coolers.

Refrigerator : An apparatus for producing and maintaining low temperature. The working principle is that heat is absorbed by a liquid as it evaporates. This evaporation reduces the temperature continuously. The refrigerent used is liquid ammonia or freon .

Lightning Conductor : The working principle is the discharge of electricity at sharp points. The pointed conductors fixed on top of buildings are charged by induction through the atmospheric electricity. When a lightning occurs, the charges on the conductors neutralize the charges of lightning and when a discharge of lightning electricity does strike, the discharge is carried down to the earth through the metal strip without damaging any part of the building.

Arc Lamp : An electric arc (carbon arc, mercury arc, metallic arc) is produced when an electric current flows through a gap between two electrodes, the current being carried by the vapour of the electrode. When the current flows in the form of an arc it becomes a very bright source of light.

Transistor ; A semi-conductor device capable of amplification. The advantages of a transistor over a valve are that it is small in size, requires no heater current and the voltage at the collector can be only a few volts. A transistor has a base, the emitter and a collector.

Television : The apparatus for the transmission of visible moving images through electrical means. Light waves are converted into electrical impulses by a television camera and, after broadcasting, from the T.V. station, are reconverted into a picture on the screen of cathode ray tube in the reciver. For broadcasting, the electrical impulses have to be turned into electromagnetic radiation.

Radar : (Radio Detection And Ranging). It is a general term used for any system employing microwaves for the purpose of identifying moving objects such as ships, aircrafts, missiles or artificial satellites. The system consists of a generator which sends out electromagnetic pulses and thereby detects distant objects which cross the path of the beam. The distance of the object, its direction etc. Can be calculated.

Computer : An electronic device which can accept data, apply a series of logical processes to it and supply the results of these processes as information. It helps mathematical calculation and can be of use for routine office calculations, control of industrial process etc. Two main types of computers are analog computer and the digital computer. Analog computers where numbers are represented by magnitudes of physical quantities such as voltages are better suited for scientific problems. Digital computers using numbers (binary notation) are preferable for production control and office establishments. Mini-Computers having a small range of operation are nowadays widely used.

Electronic Microscope : The basic working principle is the same as in an optical microscope that is magnification of the image of an object through a series of lens. Instead of light, as in any optical microscope, a beam of electrons is used. The image produced will have to be read differently from that in a o

cal microscope. The magnification in an electron microscope can go upto 10,000 times, compared to only 500 times in an optical telescope.

Steam Engine : A device used in railway engine. Conversion of heat into mechanical energy is the basic principle. Water in a boiler is boiled with coal as the fuel. The steam released is used to move the piston within a cylinder. The backward and forward movement of the piston is converted into a uni-directional movement of the wheels.

Internal Combustion Engine : The working principle is the operation of a piston within a cylinder through mechanical energy which is obtained by conversion of chemical energy. Petrol mixed with air and ignited produces a gas stream which pushes the piston, thereby starting the operation of the backward and forward movement of the piston in the cylinder. This engine is used in motor car and other machines.

Diesel Engine : A form of internal combustion engine which uses diesel instead of petrol. The main difference between a diesel engine and petrol engine relates the mode of ignition. In a petrol engine the ignition will occur only if a spark is produced. In the diesel engine the mixture of air and diesel, when compressed rises to a high temperature and automatically ignites. In general diesel engine is more efficient than petrol engine and the fuel cost is less.

Jet Engine : The basic working principle is Newton's third law of motion. A gas turbine is used to compress air and push it into the combustion chamber. In this chamber the fuel burns and releases gas stream which rushes out of the rear as a fine jet with a very high speed. As a result, the reaction pushes the engine forward.

Rocket Engine : The main difference between a jet engine and the rocket engine consists in the lack of availability of air for the rocket engine. For a jet engine which works in the lower layers of atmosphere, sufficient air and hence oxygen is available freely. But rocket requires liquid oxygen or some other oxidiser for burning in the engine. The second difference lies in the lack of air resistance for the rocket. The jet

faces air resistance and can make use of air for controlling the flight through the wings and the rudder. This does not happen in the case of a rocket engine. Newton's law of reaction applies to rocket engine also.

Submarine : The basic principle is that the depth of a body inside water is determined by its density. By pumping water in and out, the ship is able to go down or up in the water in the sea.

Solar Energy Devices : Harnessing of solar energy for use in the form of heat energy or electrical energy through different appliances is being perfected in experiments in different parts of the world. A solar panel is generally used for collection of sun's rays. The collected solar rays are made to converge to a focus to get concentrated energy. solar energy has been used for solar cooker, domestic heating etc.

Laser : (Light Amplification by stimulated Emission of Radiation) provides intense and unidirectional beam of light. It is a device developed only in 1970. If any atom is excited by our pumping some amount of external energy (either by heat or bombardment of photons), the sub-atomic particles i.e. electrons jump from one orbit to the next i.e. to the next higher energy level. If any photon bombards an atom at the excited condition or at higher energy level, then it will emit the excess energy instantaneously. Laser is used to illuminate, melt, weld, perforate and to ignite ; determine the distance and other details of motion regarding distant bodies ; in general medicine and surgery.

Bio-Technology

Bio Technology : Technology that effects changes in biological organisms.

Tissue Culture : Artificial bringing up of tissues. The technique may be applied for producing rapid multiplication of certain desirable or rare plants, to recover healthy stocks from plants infested with virus and for somatic hybridization. A tissue is brought up in a basal medium comprising substances essential for plant growth such as sugars, vitamins mineral salts etc.

Growth Regulators : The chemicals auxins and cytokinin which are used to produce proper growth in plants. They are made use of in tissue culture.

Embryo Culture : Culture of embryos in the artificial medium. The technique is useful for producing certain cross breeds.

Somatic Hybridization : The method of bringing about fusion in plant cells. The cellulose walls and the pectin-rich matrix of cells offer resistance to fusion of unlike cells. This technique overcomes this resistance and effects hybridization.

Protoplast Fusion : This is a form of hybridization, known as parasexual hybridization. It produces crossing between unrelated species which has been considered impossible hitherto. The technique was invented in 1965 by Harris and Watkins. Cells from different animal species such as mouse and man can be made to fuse to form hybrid cells. However, the hybrids have not been viable and no hybrid animal has been produced. But in the case of plants the technique has been successful. Fusion of plant protoplasts with human cells and other animal cells has also been reported.

Cloning : A genetic engineering technique which produces identical replicas of a living organism. Plant clones have been traditionally produced by vegetative propagation. Tissue culture method also can be used to produce clones of plants. However, extension of this technique to higher animals involves various problems. It will require culturing of a human cell in an artificial medium and implanting of extracted nuclei into enucleated eggs. If these eggs develop into embryos clones or identical human beings may be produced. Cloning will result in preserving of a particular genotype which is nowadays lost with the death of an individual.

Genetic Engineering. The technology that aims at adding or removing or changing genes at will within a cell nucleus. Since genes are involved, genotype of the individual can be changed at will. Hargovind Khorana [perfected the technique of test tube synthesis of a given sequence of nucleotides. From the DNAs, genes may be extracted and purified in an artificial

medium. The next stage of genetic engineering is transferring the DNA segments of one organism to another. This is called '*gene transplant technique*'. There are two methods of effecting this transfer. One is transformation by which a cell or tissue takes up a particular DNA segment from the surrounding. The other is transduction in which a virus infects a bacterium and carries with it a DNA segment of the bacterium and inserts it into another host organism. Another gene engineering technique that has been lately developed is the use of two groups of enzymes restriction endonuclease and ligase for producing the recombinant DNA molecule. The technique uses the restriction enzymes to splice plasmids and the foreign DNA molecules at specific points in a DNA strand. Later their free ends are tied by bigase to produce to new completed DNA. Genetic engineering is useful for gene therapy to cure hundreds of hereditary diseases, for nitrogen fixation and for production of new cells proteins and antigens for vaccines. However, the dangers inherent in genetic engineering such as creation of new types of infection and production of dangerous new species of organisms cannot be ignored.

Chemistry

PHYSICAL CHEMISTRY

Chemistry is the science primarily concerned with preparation, properties, structure and reactions of material substances. All matter may be classified into four states—solid, liquid, gas and plasma. This classification is done on the basis of rigidity, volume and shape. A solid is rigid, occupies definite volume and possesses a definite shape. A liquid is not rigid and hence does not have a shape but has a definite volume. A liquid assumes the shape of the container. A gas has no rigidity, shape or volume. The shape and volume of the container is the shape and volume of the gas within it. Plasma is a state of matter containing gaseous ions and occurs only at very high temperatures.

The second classification of substances is into elements, compounds and mixtures. A mixture is a combination of two or more elements or compounds in any indefinite proportion. A compound is a substance formed by the combination of certain elements in definite proportions. It is different from a mixture of elements. The constituents of a mixture exhibit their individual properties, whereas the constituents of a compound lose their separate identities. The components of a compound can be recovered, if at all, only through specific chemical changes. The components of a mixture may be separated through various methods—some simple and some complex. A solid which is insoluble may be separated from a mixture of the solid and a liquid by the process of setting, filtering and centrifugation. A solid which is dissolved in a liquid may be separated from the liquid by crystallisation, evaporation of liquid and by the method of solvent extraction. Mixtures of two

liquids may be separated by using the separating funnel when they are immiscible ; if miscible, by fractional distillation and by solvent extraction. A mixture of gas and liquid may be separated into constituents by boiling the solution and by bubbling in another gas through the solution. e.g. Oxygen dissolved in water may be removed by bubbling in nitrogen or hydrogen. The constituents of a gaseous mixture may be separated by cooling, by using a solvent absorption and by partial diffusion.

Chemical Reactions : Physical changes are changes in which the molecules of the substances remain unchanged. Chemical changes are changes in which the molecules undergo change and form new varieties of molecules. Chemical reactions may be exothermal or endothermal. An exothermal reaction is accompanied by release of heat. An endothermal reaction is accompanied by absorption of heat. The conditions under which chemical changes may take place are : raising the temperature of reactants ; exposure of reactants to light ; application of an electric field ; physical contact between the reacting molecules ; activation by mechanical processes.

Solubility : The solubility of a solute is the weight of the solute present in 100 grams of the solvent to make a saturated solution at a specified temperature'

Saturated Solution : A solution which can stay in equilibrium with the solute without increase or decrease in concentration for any length of time at a given temperature.

Acid : A substance which liberates hydrogen ions in solution ; substance which *contains hydrogen* which may be replaced by a metal to form a salt ; substance having a tendency to lose protons. Many acids are corrosive, have a sour taste, and turn litmus red.

Base : A substance which reacts with an acid to form a salt and water only ; substance which has a tendency to accept protons ; substance which yields hydroxyl ions if dissolved in water.

Alkalies : Those bases which are soluble in water are called alkalis, e.g. caustic soda, caustic potash. They have a

soapy touch and bitter taste. They turn red litmus blue, and yellow turmeric paper brown.

Salt : Salt is a substance obtained when an acid and a base react together. There are varieties of salts. They can be prepared by the action of acids on metals, their oxides or bases, e.g., calcium sulphate, potassium nitrate, sodium chloride (common salt or table salt).

Calorescence : Absorption of light radiation by a surface, and emission of heat radiation by converting light into heat.

Fluorescence : The property of certain substances (e.g. paraffin oil) by which they absorb light (of one colour) and in its place emit light of another colour. The phenomenon ceases with the disappearance of the source of light.

Phosphorescence : The property by which a substance absorbs electromagnetic radiation of shorter wavelength and emits light of longer wavelength. Phosphorescence may continue even after the source is removed.

Catalysis : The alteration (generally, increase) in the rate of chemical reaction, caused by the introduction of a catalyst which remain unchanged at the end of the reaction. A catalyst is generally required in small quantities.

Dialysis : The separation of colloids in solution from other dissolved substances (crystalloids) by selective diffusion through a semi-permeable membrane. Such a membrane is slightly permeable to the molecules of crystalloids but not to the large molecules in the colloidal state.

Dalton's Atomic Theory : (1) Atoms can neither be created nor destroyed or altered in any manner. (This proposition is not true). (2) All atoms of the same element have identical mass, and other properties. (3) Different elements have different atoms.


Dalton's law of partial pressures : At a specific temperature and for a container of fixed volume, the total pressure of a mixture of non-reacting gases is the sum of their respective partial pressures.

Le Chatelierts Principle : Endothermic reactions will be favoured by increase of temperature ; exothermic reactions will be favoured by decrease of temperature.

Kinetic Theory of gases : The molecules of a gas are in continuous random motion and the molecular kinetic energy of a gas increases with temperature of the gas.

Electronic configuration of elements : An atom consists of a small nucleus containing protons and neutrons. The electrons form a cloud of negative electricity outside the nucleus. The electrons are arranged according to their energy levels, quantified by numbers 1, 2, 3, 4 (principle quantum number) or by letters K, L, M, N. These energy levels represent the potential energy of the electrons and are referred to as shells or orbits. The lowest energy level corresponding to quantum number 1 and letter K is capable of accommodating only two electrons. Similarly, L (2), M (3), and N (4) shells can accommodate 8, 18 and 32 electrons respectively.

Chemical Bonding : When two or more atoms come together and behave as if they are held together by some kind of bond, the process is called chemical bonding. Molecules are formed through chemical bonding. When atoms combine to form molecule, the potential energy of the system decreases and hence the resultant molecule is always more stable than the combining atoms. The larger the energy decrease in the formation of molecule, the more stable is the resulting molecule. A set of elements which do not show the tendency of forming bonds with the other elements are called inert or *noble gases*, e.g. helium, neon, argon, krypton and xenon. It is known that these elements belong to Zero Group in the Periodic Table. This means that their outer shells are already having eight electrons. It is found that when the outermost shell of an atom contains eight electrons, that shell shows maximum stability and resists change in its configuration.

Electro-valent Bonding : If the chemical bonding occurs as a result of transfer of electrons from one atom to another, the bonding is called electrovalent bonding and the resulting compound is called electro-valent compound.  This

bonding involves the formation of ions, it is also called ionic bonding. The important characteristics of electro-valent compounds are derived from the nature of bonding. They have high melting point and high boiling point and are readily soluble in water, releasing the respective ions. In molten state and in water solution they are good conductors of electricity.

Co-valent Bonding : If in the chemical bonding, there is electron sharing (not mere transfer from one to other), the resultant bonding is the co-valent bond and the compounds so formed are covalent compounds. Such compounds generally have low melting point and low boiling point. The inter-molecular force is very much weaker compared to electro-valent compounds. They are sparingly soluble in water but dissolve better in organic solvents like ether, chloroform, alcohol etc. Covalent compounds consist of electrically neutral molecules and hence do not produce ions in solutions. They do not conduct electricity.

Oxidation and Reduction : The original meaning of this term was formation of an oxide by absorption of oxygen. e.g., rusting of iron, combustion of methane and burning of magnesium in air. Any substance which brings about oxidation reaction is called oxidising agent. The extended meaning of oxidation nowadays is any reaction involving addition of non-metallic elements or removal of hydrogen or other metallic elements. Any of these reactions can occur only in the presence of an oxidising agent. Considering the changes in the electronic configuration as a result of oxidation oxidation may be interpreted as a reaction accompanied by loss of electrons. The opposite phenomenon is reduction, which is a chemical reaction involving removal or loss of oxygen ; or removal of other non-metallic elements : or addition or gain of hydrogen ; or addition of metallic elements. The substance which brings about this reaction is called reducing agent. In terms of changes in electronic configuration in the molecule, reduction may be interpreted as gain of electrons. It may be easily seen that oxidation and reduction are simultaneous reactions and hence the term redox reaction (reduction-oxidation) is used

for this purpose. The number of electrons lost in oxidation is equal to the number of electrons gained in reduction.

Periodic Law: Properties of elements are periodic functions of their atomic numbers. Based on this law all elements are arranged in a *Periodic Table* in the ascending order of the atomic number. The periodic table arranges all elements into 18 Groups—16 vertical columns and 2 horizontal rows. Elements placed in any group have almost similar chemical properties. The last group is called the zero group. The chemical properties of an element are determined by the arrangement of electrons, particularly the number of electrons in the outer-most valence shell. Elements with atomic numbers 58 to 71 form Lanthanide series having very similar properties. Elements with atomic numbers 90 to 103, forming actinide series also have very similar properties. These two series are placed in horizontal rows at the bottom of the Periodic Table.

CARBON FAMILY

Elements carbon, silicon, germanium, tin and lead are members of Group IV A (carbon family). Only carbon occurs in free state in the form of coal, diamond and graphite. It also occurs as inorganic compound (carbon dioxide in the atmosphere and carbonates in rocks and minerals) carbon is present in petroleum and is an essential constituent of all living organism (organic compounds). Silicon is the second most abundant element on earth (28%) after oxygen (60%). It occurs in the form of silica and silicates. Germanium is a rare element. The transition from non-metallic properties to metallic properties is illustrated by this Group : carbon (non-metal) ; Silicon (non-metal with some metallic properties) ; Germanium (metalloid) ; tin and lead (metals).

Carbon exists in allotropic forms such as diamond and graphite (crystalline) ; and coal, coke, charcoal (amorphous). The differences between diamond and graphite are many. Diamond is hard and has a high melting point. It is a non-conductor of electricity. Graphite is soft and good conductor of electricity. Diamond is expensive because it is available on earth only in very small quantities. Over a long period

graphite changes to diamond. Diamond may also be artificially manufactured by employing very high pressure on graphite. However, artificial diamonds do not have the lustre of natural diamonds.

Carbon dioxide : (CO_2) : Carbon dioxide is a very stable oxide and can be condensed into a solid state. Solid carbon dioxide is known as dry ice, since it sublimates without liquifying. Solid carbon dioxide is used as coolant.

Carbon Monoxide : is very reactive and harmful to human beings. It is a good reducing agent.

Silicates : Occur in nature as compounds in the form of quartz, asbestos, mica, feldspar and zeolites.

Glass : Glass is got by rapid cooling of silicate melts. Ordinary glass is a mixture of silica (sand), sodium silicate (soda ash) and calcium silicate (limestone). Glass is prepared by heating all these three materials together to a high temperature. If glass is cooled very rapidly, it becomes brittle and fragile, if cooled too slowly, it becomes opaque. A special type of glass flint glass is used for the manufacture of lenses, prisms and optical instruments. It is produced by replacing Calcium by lead. Coloured glass is manufactured by addition of certain metallic compounds in the molten state of the glass. Cobalt compounds give blue colour ; chromium or copper, green colour ; selenium, Red colour.

Tin and Lead : Tin occurs in nature as Tin Stone (Cassiterite). It is used as protective coating on the surface of other metals such as copper and brass, cooking vessels and iron plates. Tin is an important component of alloys—bronze and type metal.

NITROGEN FAMILY

Nitrogen : Elements nitrogen, phosphorus, arsenic, antimony and bismuth constitute Group V A (nitrogen family). Nitrogen occurs in the form of air (a mixture with 78% nitrogen). It is an essential constituent of fertilisers, explosives and proteins. It is a gas which is relatively inert and reacts only at very high temperatures. Nitrogen combines with oxygen only at

high temperatures. Among the compounds of nitrogen a very important one is ammonia which is produced, employing low temperature and high pressure. The main use of ammonia is in the manufacture of fertilisers. It is highly soluble in water. Liquid ammonia, like water undergoes self-ionisation and is used as a medium for carrying out other reactions. Among the more important oxides of nitrogen we have nitrous oxide known as laughing gas which is colourless gas and the least reactive. The other is nitric oxide, which is poisonous and acts as an oxidant and a reductant.

Phosphorus : Does not occur in the free state. White phosphorus burns with atmospheric oxygen even at room temperature. The other allotropic form, red phosphorus is less reactive. It is found in bones and phosphate ores like phosphorite, apatite etc. Many phosphates like ammonium phosphate and super-phosphate of lime serve as fertilisers. Sodium phosphate is used for softening hard water. Pyrophosphate is of much importance in biology since nucleic acids contain it.

Hydrocarbons

Hydrocarbons : Carbon and hydrogen are the essential components of all organic compounds. The other elements such as oxygen, nitrogen, sulphur, phosphorus may also be present in organic compounds. Earlier organic compounds were considered as the compounds which can be obtained only from plants and animals ; hence the name, 'organic'. But nowadays many organic compounds have been synthesised. Organic compounds constitute the major components of energy sources such as petroleum and coal ; components of food such as protein, fat, carbohydrate, vitamins ; and components of drug such as anaesthetics, antiseptics and antibiotics. They are essential ingredients in materials like cotton, wool, silk, synthetic fibres, paper, rubber, plastics etc. Because of their importance, a separate branch of chemistry known as 'Organic Chemistry' is there. The main reason for the existence of a very large number of organic compounds is to be found in the special nature of carbon atoms. Carbon atoms can form strong covalent bonds with other carbon atoms in compounds

of different sizes and shapes. A special feature of organic compounds is *Isomerism* i.e. two substances having the same molecular formula but entirely different physical and chemical properties. The number and kinds of atoms in isomeric molecules are the same but they differ in the arrangement of these atoms.

Classification of Hydrocarbons : The simplest organic compounds are the hydrocarbons, containing carbon and hydrogen. They occur abundantly in nature particularly in the form of petroleum, natural gas and coal. They may be considered as the parent organic compounds from which others have been derived by the displacement of one or more hydrogen atoms by other atoms. The classes of hydrocarbons are : Saturated Alkanes and Unsaturated Alkenes and Alkynes which come under the group Acyclic hydrocarbons. Alicyclic compounds and Aromatic compounds which are Cyclec hydrocarbons.

Alkanes : Also called Paraffins, are hydaocarbons in which carbon atoms form single bonds with one another. Different forms of Alkanes are methane, ethane, butane etc.

Alkanes : Also known as Olefins, are characterised by a double bond between carbon atoms. Aromatic hydrocarbons are mainly derived from benzene.

Petroleum and Coal : Petroleum and coal tar are the two principal sources of hydrocarbons. Petroleum is dark viscous liquid found trapped in porous geological strata. Most of industrial chemicals are obtained from petroleum and natural gas and hence are called pero-chemicals. Medicines, Insecticides, rubber, perfume, plastics, explosives and fuels are derived from petroleum. Coal is a very important source of aromatic compounds of various kinds. There are various theories regarding the origin of petroleum. The most commonly accepted theory hold that animals and plants that died millions of years ago and got embeded in between rock strata have undergone metamorphosis under the effects of moisture, high temperature. pressure and absence of air. Coal is derived from the remaining of plants on earth : and petroleum, from marine organisms. Most of the carbon in living

organisms is converted into natural gas (carbonaceous gases) petroleum (liquid) and solids (coal, shale, diamond etc). The difference between coal and petroleum is that coal contains unsaturated closed ring aromatic compounds where as petroleum contains saturated open chain hydrocarbons (Alkanes). Coal deposits are distributed un-evenly in earth's crust. America accounts for more than 50% of coal reserves. India also has large deposits of coal. The main petroleum-producing regions are concentrated in USA, USSR and West Asian countries.

Petroleum : Differs from field to field and the colour ranges from yellow red to black. If the crude oil remaining after removal of volatile hydrocarbons is composed of alkanes, it is classified as paraffin. If the residual crude oil is mainly composed of cycloalkanes, it is called Asphalt base. The first oil wells were the dug in North America in 1857. In India oil production started in 1867 in the oil wells of Assam. Nowadays the Bombay High off-shore oil is dug at an average depth of 90 metres in the sea bed having mud 20 metres deep.

Refining of Oil : Crude petroleum is piped to the refinery from well. It is washed with acid and alkali solutions to remove basic and acidic impurities and is then subjected to fractional distillation. In the refinery crude oil is pumped through a furnace where it is heated to 650°K . The hot liquid is passed through a flash chamber and then through a bubble tower. The different fractions of crude oil, in the order in which they come out, along with their percentage composition and uses are given below :

Gaseous hydrocarbons (2%) : Used for production of hydrogen, gasoline and gaseous fuel.

Petroleum ether (ligroin) (2%) : Used as solvent in dry cleaning.

Gasoline (petrol) (32%) : Used as motor fuel.

Kerosene (18%) : Domestic fuel.

Gas oil, fuel oil and diesel (20%) : Used as furnace fuel and in diesel engines.

Lubricating oils, greases and petroleum jelly : Used in lubrication.

Paraffin (Wax) : Used for candles, water proofing etc.

Petroleum Coke : Used as fuel and electrodes.

Hydrocarbons in gasolines have low boiling point and hence gasoline easily turns into vapour in the engine. Diesel engines differ from gasoline engines. This is because, in a diesel, engine a mixture of fuel and air is allowed to ignite spontaneously by high temperature generated by combustion without using a spark. Air is drawn into the cylinder and compressed to a higher pressure, thus raising the temperature to 570°K . Diesel fuel is then injected as a fine spray and the spontaneous ignition occurs. In a petrol engine a mixture of gasoline vapour and air is drawn into the cylinder and is compressed. A spark is then produced which ignites the gasoline mixture. Diesel engines are more efficient and less expensive as compared to gasoline engines. The exhausts of the motor engines contain small amounts of carbon and cobalt due to incomplete combustion. Since gasoline is in great demand processes have been developed for conversion of kerosene and fuel oil also into gasoline ; besides high grade motor fuels have been prepared by hydrogenation of coal.

Coal : The percentage of carbon in coal varies according to the variety ; Peat 11% ; Lignite (brown coal) 35% ; Bituminous (soft coal) 65% ; Anthracite (hard coal) 85% and Diamond 100% Coal is converted into coke by heating to a very high temperature in big ovens in the absence of air. The organic compounds which come out are light oil and coal tar. Coke which is the residue left in the oven is the main product for use in blast furnaces. Coal tar is refined further by distillation to get products like light oil, phenol, naphthalene and pitch.

IMPORTANT METAL GROUPS

Some Metals and their Ores :

Sodium	Rock Salt, Borax, Salt petre
Potassium	Felspar
Calcium	Limestone ; Dolomite ; Gypsum

Copper	Malachite ; Pyrites
Magnesium	Asbestos ; Magnesite ; Dolomite
Zinc	Zinc blende
Mercury	Cinnabar
Aluminium	Bauxite ; Cryolite
Lead	Galena
Chromium	Chromite
Iron	Haematite ; Pyrites ; Magnetite.
Titanium	Ilmenite

Chromium is a very important corrosion-resisting metal. Iron, Nickel and platinum are important metallic catalysts. Chromium, Vanadium, molybdenum, tungsten, manganese and stainless steel form alloys which are hard and have higher melting points, but are workable. Two colours are said to be complementary if lights of these two colours mix together to produce white lights. Such complementary colours are : infra-red ; and white red and blue-green ; orange and blue ; yellow and indigo : yellow-green and violet ; green and purple ; ultra-violet and white. Titanium is important for making lightweight stable alloys having high tensile strength. These alloys are extra white hard paint pigments. Tungsten is used for making filaments of electric bulbs, since it can be heated to white heat without evaporation or losing shape. Chromium is used to provide a scratch-resisting, non-rusting and highly shining protective coating to other metals through electroplating. Chromium and manganese are used to make alloy steel and stainless steels. When ammonium dichromate is heated, initially sparks occur. This phenomenon is called chemical volcano. This is due to the formation of nitrogen. Potassium Permanganate is used for disinfecting well water.

Iron Group : Several important metals belong to this group. Iron, cobalt and nickel form a triad. Iron is produced in different forms. Pig iron produced in a blast furnace contains 5% carbon. It is also called cast iron since it can give good castings because of the property that this iron expands slightly on cooling. Cast iron is corrosion-resistant and is hence used for sewage pipes. However, it is brittle

and weak for building structures. *Steel* : There are many kinds of steel but all of them are alloys of iron and carbon in which the percentage of carbon varies from 0.2% to 2%. When the carbon content in iron is less than 0.2% we get wrought iron. It is soft, malleable and easy to weld but cannot be magnetised permanently and is weak for structures. So it is normally used for making chains, wires and electromagnets. The hardness of steel depends on its carbon content and heat treatment. If steel is heated to redness and suddenly cooled by plunging it into water or oil, this treatment is called *quenching*. Quenched steel is hard and brittle. If this is reheated to a definite temperature and kept in that temperature for a specified time, tempered steel is produced.

Alloy Steels : May be produced by adding some other metal to the compound of iron and carbon. Stainless steel contains 18% chromium and 8% nickel and does not rust and corrode in atmosphere, water, mild acids or mild alkalies. In India since nickel is costly and manganese is available in plenty, manganese replaces nickel in the stainless steel, products. Stainless Steel is useful for household utensils, blades, watch cases etc. Nickel steel contains 3.5% nickel and is hard, flexible and is used for cables and armour plates. Chrome-vanadium steel containing 1% chromium and 0.15% vanadium is tenacious and hence is used for axles springs etc. Manganese steel contains 15% manganese. It is extremely hard and high melting and hence is used for burglar-proof safes and rock crushers. Tungsten steel containing 20% tungsten and 5% chromium is very hard and strong and is used for cutting tools and springs. Invar steel containing 36% nickel has extremely low expansion and hence is used in clock pendulums. Alnico steel consisting of aluminium 12%, nickel 20% and cobalt 5% is highly magnetic and is used for permanent magnets.

Iron in human body is mainly present in the form of haemoglobin, in the blood. This acts as a carrier of oxygen which is loosely held by the iron atom. If carbon monoxide attaches to the central iron atom to form carboxy haemoglobin

blood loses its power of attaching oxygen and so the person dies of suffocation. The same happens in the case of cyanide poisoning or death by snake bite.

Corrosion : is a process in which useful metals are lost and compounds, generally oxides are formed due to chemical action with the environment. In the case of iron, corrosion takes the form of rusting. Rusting takes place in the presence of moisture, oxygen and carbon dioxide in air. Thus, in water tanks made of iron, we find that rust forms mostly near the top. Rust is a non-sticking compound which peels off exposing fresh iron surface for further rusting. Rusting and other corrosions are electro-chemical processes. There are various techniques for preventing corrosions of metals. The normal method adopted is barrier protection. An impenetrable film of oil, paint or any other non-corroding metal is applied on the surface of the iron material so that a barrier is created between iron and atmospheric air. The second method, called sacrificial protection, consists in covering iron surface with another active metal which loses electrons preferentially. Galvanisation, the process of covering iron with zinc coating comes under this category. Zinc, magnesium and aluminium powders can be applied as protective layers on iron. Iron pipes buried underground are generally given 'electrical protection'. Anti-rust solutions are used in car radiators and others and other materials to prevent rusting of iron.

Copper group : Copper, silver and gold are metals in this group. They are known as coinage metals since they have been used for minting coins all over the world. However, nowadays Indian coins are made of Aluminium and nickel. All metals of this group occur in free state as well as in compounds. Copper is extracted from sulphide and oxide ores. Native silver is rarely available and so most of the silver is got from silver chloride, silver sulphide. Gold is mainly mined in free state or is recovered from anode mud during the process of electro-refining metals like copper and nickel. The compound of gold found in nature is gold telluride. All the metals of this group are less reactive ; in

particular gold, which is treated as a noble metal. Reaction with air, water, acid and alkalies is rarely there.

Some alloys of copper are the following : brass, (containing 40% zinc) used for utensils etc. ; bronze (containing 10% tin) used for statues, control valves etc. : Aluminium bronze (containing 10% aluminium) used for paints and imitation jewellery ; bell metal (containing 20% tin) used for bells ; Gun metal (containing 10% tin and 20% zinc) used for gears and bearings ; German silver (containing zinc 30% and nickel 10%) used for utensils, wires etc. Silver is used for jewellery and for spark plugs. Silver salts are used in photography and in electroplating. Since gold is extremely malleable and a good conductor of electricity, it is used at suspension points in Galvanometers.

Carat is a measurement of purity of gold. Pure gold is assigned 24 carats. Jewellery in India consists of 22 carats i.e., two parts in 24 are allotted for alloying metal, silver or copper.

Photography : The photographic film or plate is prepared by coating an emulsion of silver bromide in gelatin solution. When it is exposed to light, silver atoms are formed on the parts which receive light. During development, the exposed film is passed through an alkaline solution as a result of which more silver bromide gets reduced to give black silver in area exposed to light in proportion to the intensity of light. Since the unreacted silver bromide will still be on the film, developing has to be done in the dark. Otherwise a general blackening of the picture will occur. The developed picture is called the negative. The film is next passed through a solution called hypo. Then the negative film is put in contact with bromide paper or another sensitive film on which a black and white picture appears. By a changed process, if the developed negative picture is treated with an acidic oxidising agent, a transparent picture of the positive can be produced. This is called a slide.

PRACTICAL APPLICATIONS OF CHEMISTRY

Polyfunctional Compounds : A compound in which more than one functional group (similar or different) are present is

called a polyfunctional compound. In such a compound the functional groups interact to such an extent as to produce certain properties which are not characteristics of either of them.

Lactic Acid : Occurs in sour milk. Curdling of milk is due to bacterial fermentation of lactose (milk sugar) to lactic acid. It is used as an acidulant in food stuffs.

Lactates : Are used in medicine, wool dyeing and calico printing.

Tartaric Acid : Present in grapes, tamarind and other sour fruits. Formed during fermentation of grape juice. It is used as silver nitrate, in mirroring glass. Cream of tartar is used in baking powder.

Citric Acid : Occurs in fruits, specially in citrus fruits like lemon and orange. The juice is boiled to coagulate proteins and filtered and is neutralised with lime. It is readily soluble in water and alcohol. Used for making beverages. Its derivatives are used as antacids and as anti-coagulants in blood transfusion.

Salicylic Acid : Occurs in many essential oils and may be prepared from phenol. It is a colourless crystalline salt which dissolves readily in water and alcohol. It is used as an antiseptic and preservative. Its derivatives are used for perfumes and coating of pills, which are intended to pass through stomach without dissolving.

Asprin : One of the well-known analgesics and antipyretics is acetyl salicylic acid.

Bio-molecular : Molecules of very complex nature are founding living systems. They are essential for life and perform specific functions. Carbohydrates, proteins, nucleic acids, lipids are very heavy and complex molecules. Vitamins and mineral salts are relatively simple molecules. Water constitutes 70 to 90% of the body weight for all living organisms.

Carbohydrates : They consist of hydrogen and oxygen in the ratio 2 : 1 (as in water) besides carbon atoms. In other words,

they are hydrates of carbons. Carbohydrates are monosaccharides (simple sugars), disaccharides and polysaccharides. Important monosaccharides (simple sugars) are triose, tetrose, pentose etc. Common sugars are known to have their relative sweetness as follows : Sucrose (cane sugar) 100% ; Lactose 16% ; Maltose 33% ; Glucose 74% ; Fructose 173% and Invert sugar 130%. Glucose is obtained from starch or glycogen. This is the chief form in which carbohydrates are transferred from cell to cell in all organisms, Starch is hydrolysed in the presence of certain enzymes in the human and animal digestive systems. But cellulose needs different kinds of enzymes. In the case of grazing animals these enzymes are present in the digestive system and hence they can consume cellulose of grass and plants as food.

Lipids : Fats and their derivatives occurring in living systems. Lipids are insoluble in water, soluble in chloroform and other organic solvents. Fats and fatty acids are important modes of food storage in living organisms. They are richer sources of energy than carbohydrates. In certain animals they act as heat insulators and shock absorbers. Waxes are a group of substances related to fats.

Vitamins : Vitamin A is Carotenoid. It is a derivative of Carotenes which occur in tomato, pumpkin, carrot, egg yolk, milk and butter. Deficiency of vitamin A in growing animals retards growth and creates Xerophthalmia, a disease of the eye in which corneas become opaque. Vitamin A deficiency may also cause night blindness and drying up of skin.

Harmones : These chemical substances are produced in endocrine glands. Exert regulatory control over the chemical processes in the body.

Polymers : Substances in which molecules are very big and are made up of simpler molecules known as monomers. Natural polymers are cellulose, wood, silk, skin, rubber etc. Cellulose is obtained from cotton and wood (wood 60% ; cotton 90%). Cellulose is used in the manufacture of fibres, rayon, explosives like gun powder, cotton and plastics like Celluloid. Viscose is the product obtained through the

application of viscose process on cellulose. Wool, silk and leather are protein polymers.

Synthetic Polymers : Substances produced in factories from small molecules called monomers. The two polymerisation processes are addition and condensation. Some addition polymers are given below *polythene*s used in the manufacture of pipes, bottles, buckets etc., and for coating on electric wires, cables and other materials ; *polypropylene* is harder and more tenacious and is used for fibres, seat covers and stronger pipes and bottles ; *Poly vinylchloride* (PVC) is used for manufacture of rain coats, gramophone records, wax, curtain cloth and is a good electrical insulator used in hose pipes, wires and other electrical goods ; *Polystyrene* is used in the manufacture of plastic toys, radio and T.V. products, refrigerator lining etc ; *Telefon* is a polymer flexible and chemically inert and is used for valve seals, filters cloth, gaskets etc. *Synthetic rubber* is a polymer similar to natural rubber and is used for manufacture of automobile tyres.

Some condensation polymers are resins, terelyn are nylon. Resins of various kinds are used in plywoods, paints, lacquers. Terelyn or Decron is used as a textile fibre. Varieties of nylons are fabricated into sheets and textile fibres.

5

Biology

Systematics : A disciplin in biology which deals with classification, identification and nomenclature of all organism based on the existing relationships among them. Earlier the term Taxonomy was used for this purpose.

Classification : A method of arranging organisms into groups of different kinds based on their relationships. Taxon is a unit of classification of organisms.

Identification : The process of fixing the position of a given organism in the scheme of classification.

Nomenclature : The other process involved in Systematics i.e. assigning scientific names to animal and plants. A nomenclature consists of two words for plants, the first indicating the genus and the second indicating the species. The binomial nomenclature is universally followed for all plants. Generally for animals there are three parts in the name, indicating the genus, species and sub-species.

The hierarby of categories among living things are the following : Kingdom ; Phylum (for animals) and Division (for plants) ; Class ; Order ; Family ; Genus and Species. Sometime sub-species also is recognised. The kingdoms recognised are two—Animals and Plants.

Phylum is the highest category for animals. About the number of phyla there are differences of opinion. However, some notable phyla along with instances are given below : Each phylum is differentiated from the others in many characteristics. Protozoa (amoeba, entamoeba, euglena, paramoecium) ; Porifera (freshwater sponge) ; Coelenterate (hydra, sea anemone) ; Ctenophora (comb jelly) ; Platyhel-

minthes (tape worm) ; Nemertina (amphiporus); Aschelminthes (round worm, hook worm, Guinea worm) ; Annelida (earth worm, leech) ; Mollusca (Cuttle fish, Octopus) ; Arthropoda (Crustacea like prawn, shrimps, Insects like butterfly, house-fly, cocroach, mosquito, bed bug, honey bee ; Arachnids like scorpion, spider, centipede) ; Echinodermata (star fish ; sea cucumbur) ; Chordata.

The number of species in each of the phyla varies widely from a few hundreds to lakhs. The biggest animal phylum is Arthropoda containing about 8,40,000 species. Chordata is the phylum which accommodates all the well-developed animal species. There are some sub-phyla of Chordata, the biggest of which is the Vertebrata. The important classes of Vertebrata are Amphibia (salamander, toad, frog) ; Reptilia (crocodile, snake lizard, turtle, chamaelon) ; Aves (Birds such kite, cuckoo, cock, sparrow, pigeon) and mammalia. Nearly 3,700 species of Mammals are well-known. They form different orders, families, genus and species. e.g. Human beings belong to the species *Homo Sapiens* (wise man) which is within the genus *Homo*, which is within the family *Hominidae* which belongs to the order of *Primates* which includes monkey, gorilla etc. *Primates* is an order in the class *Mammalia*.

Amphibian : An animal that lives on land water.

Reptile : An animal that crawls, such as snakes, lizards and turtles.

Chordata : A phylum of animals having notochord, hollow dorsal nerve chord and gill slits.

Vertebratae : Animals having vertebral column (back bone).

Cold-blooded animals : Animals which do not have definite body temperature and whose temperature changes according to surroundings. e.g. fish.

Warm-blooded animals : Animals which have got definite body temperatures, which are protected from the impact of variations in the external temperature through the appropriate bodily mechanisms. e.g. mammals.

Some well known categories of plants are : bacteria, algae, fungi (yeast, mushroom), bryophyta (mosses) pteridophyta (fern), gymnosperms (pines), angiosperms (lotus, neem, mango etc.).

Differences between plants and animals : The modes of nutrition are different. Plants are producers while animals are consumers. Plants are generally fixed to a spot whereas animals have locomotion. Animals grow up to a certain period and do not increase in size afterwards. Thus animal growth is terminal. In the case of plants, growth is continuous. The basic difference in cell structure between the animals and the plants is to be found in the rigid cellulose walls of the plants cells. There are no rigid walls in the animal cells. Besides, in the plants cells there are plastids which are not found in animals cells.

LEVELS OF GROUP ORGANISATION OF LIVING ORGANISMS

We know that each species of animals or plants contains several units called individuals cannot lead isolated life, for purposeful existence, lives of various organisms are organised in populations, communities, biomes and biosphere. An aggregate of individuals of a particular species in a definite territorial area is called *population*. A *Community* is defined as an aggregate of various kinds of populations in a locality. Although they may belong to different species, these populations are associated with one another for their existence. A *Biome* (Ecosystem) comprises several communities which are dependent on the inanimate environment. The physical environment of the region in which these communities live together is an integral part of the ecosystem. Thus biomes may also be considered as natural ecological groupings of plants and animals in different geographical regions, Biosphere is the name given to the totality of all biomes in the world.

Population : It is a geographically localised group of individuals of the same species. Since a species consists of individuals capable of inter-breeding to produce fertile off-

springs, this characteristic should also be applicable to a population. is organised at a higher level than the organisms, the characteristics of the population are the characteristics of the group rather than those of individuals. Density of population is an important structural characteristic. The immediate factors effecting population density are birth rate, death rate, emigration rate and immigration rate. A periodic departure and return of individuals, called migration, is not normally taken into account for calculation density. The population density is obviously affected and controlled by the environmental factors, both biotic (living and abiotic (physical). Environment is responsible for food supply, availability of space, interaction among organisms and weather. Where food supply is abundant, generally there will be dense population. Regarding available space the terms 'home range', 'territory' and 'nest' are relevant. Home range is a large area in which the individuals generally restrict their activities in search of food and mate. Territory is a much smaller area which is defended actively against other members of the same species. Nest refers to the dwelling place or rest place. Weather may be hospitable or inhospitable. It may be responsible for high mortality rates in certain areas, e.g. cattle population in a drought area, Tropical humid regions are ideal for breeding of malaria mosquitos whereas temperate regions are generally free from them. In deep sea, below 200 metres, no green plant lives.

Community: Also called as Biota. A biotic community comprises several populations of different species in a locality. The characteristics of community are trophic organisation, stratification, dominance, variety, interaction and succession. The trophic levels in a community are *producer*, *consumers* and *decomposers*. 'Producers' refers to all the green plants in a community which synthesise food for the entire community. Consumers are animals and non-green plants which consume food without producing food. If an animal feeds on plants only, it is called herbivores: whereas animals feeding on plants and other animals are carnivores. Decomposers such as bacteria, fungi and vi

the operation of de-composing the dead bodies, so that the products of decomposition such as carbon dioxide, nitrates and phosphates may be passed on to the physical environment from dead organisms.

Relationships in a community: The different kinds of relationship among organisms in a community are discussed below: *Predation* is the relation between a predator and its prey such as lion—deer, snake—rat etc. Predator may be useful in regulating or limiting the prey population within a community, so that a stable community of prey may thrive on the existing resources. *Parasitism* is the relation between a parasite and its host. A parasite lives on or in the host, and takes food from it. When the parasite itself is subjected to parasitism, the relationship is called hyper-parasitism. When a parasite kills the host, the result may be disastrous to the parasite as well. Some parasites have complex life-cycles involving intermediate hosts as in the case of malarial parasites. *Scavenging* is the next type of relationship which prevails between a dead animal and the eater. Animal scavengers such as hyaenas, vultures and jackals provide the natural sanitary service to different areas of land, by cleaning the dead animal debris. *Commensalism* is the relationship between a beneficial organism and an unaffected organism. Generally the benefiting organism does not harm the other. Examples are epiphytes, climbing on trees for support; sucker fish feeding on the waste of shark meals by remaining underneath the sharks. *Mutualism* is the relationship between two organisms which derive mutual benefits. Well-known examples of mutualism are the relationship between legumes and nitrogenfixing bacteria, found at the nodules of the roots of legumes; the relationship between the tick bird and rhinoceros; the relationship between a buffalo and the crow sitting on it. *Competition* is the relation between members of community who compete for something. Competitors may belong to the same species or may be inter-specific. Competition is a natural means to maintain the balance between the members of organisms and the available resources. Plants compete with one another for light and

nutrients; animals for food and shelter and for mating partners. Intra-specific competition is responsible for regulating species population.

Symbiosis : Meaning 'living together'. The term is applied to the relation of commensalism, mutualism and parasitism. Symbiosis between two organisms may be beneficial or harmful to either depending on the type of relations.

ECOLOGY

Ecosystem : The relationship between the biotic community and the abiotic environment in which it exists. e.g. a pond, a forest, a small aquarium.

Components of Eco-system : A biotic community should consist of producers (autotrophs), consumers (heterotrophs) and decomposers (saprotrophs) so that there is a cyclic exchange of materials between the living community and the environment. The non-living environment of an ecosystem consists of the basic organic and inorganic substances, such as water, carbon dioxide, oxygen, nitrogen, phosphorus and other elements. An eco-system should be structurally self-sufficient for continued existence.

Biomes : Natural ecological grouping of plants and animals determined and controlled by the interaction of regional climates with regional biota. A biome may be very small as a pond or very big as a sea or desert.

Aquatic biomes : biomes which are based on water. There are two sub-categories — marine and fresh water. Marine biomes are found in sea, sea-shores and estuaries. Fresh water biomes are found in streams and rivers, ponds and lakes, marshes and swamps. Planktons, nekton and benthos are three categories of aquatic life. *Planktons* are passively-floating organisms, mostly composed of microscopic plants (phytoplankton) and microscopic animal (zooplankton). *Nekton* comprising fishes, turtles, seals, dolphins and whales are the swimmers of the sea. *Benthos* are organisms that generally dwell at the bottom such as star fish, lobsters, sea cucumbers, sea anemones, corals etc. As the surface temperature of the

sea shows remarkable stability and temperature and salinity throughout the globe, sea is ideal for life. However, below 200 metres depth, the ocean does not get enough light and so this part of the sea, called aphotic zone, is free from photo-synthetic organisms. Fresh water regions are suitable for different animals and plants. Algae and fish are generally found in the rapid zone of streams and rivers. Near the banks of ponds and lakes (littoral zone) we find rooted plants, protozoans, crustaceans, insects and algae. In the deep water of ponds snails, prawns, crabs and worms generally live. Ducks find marshes fertile for their growth. Marshy grounds are also ideal for breeding of disease-carriers and pests. Large trees and shrubs grow in swamps which are inhabited by a variety of animals such as aquatic insects, reptiles and birds.

Terrestrial biomes : Four main rings of biomes are found on the land surface of each hemisphere of the earth. They are : tropical rain forests, temperate deciduous forests, Taiga or coniferous and Tundra. The presence of seas and mountains nearby naturally affects the terrestrial biomes relevant for a particular latitude. It is important to note that in the mountains environment changes with altitude ; just as, on the Plains, environment depends on latitude. Thus the horizontal sequence of biomes from the equator to poles is telescoped vertically from the base to the peak of a high mountain.

Artificial eco-system : Man has created many eco-systems according to his conception and convenience. They are agricultural land, garden, park, vegetable garden etc. Even the space capsule which takes man into space should be treated as an independent artificial eco-system. However, an artificial eco-system cannot be sustained unless the basic components of an eco-system are found there.

Biosphere : Life is found in all the three layers of the globe i.e. lithosphere and atmosphere. The totality of all biomes on earth is called biosphere. The concept of biosphere is functional rather than geographical and includes all areas of the earth, land, ocean and air, where life is found in any

form. The earth sustains the living creatures through the energy cycle and materials cycles.

Energy Flow : The basic source of all energy in the solar system is the radiant energy of the sun. Only a fraction of the solar radiation reaches the earth but this is sufficient for sustaining life on earth. The plants make use of only a fraction of the solar energy which is incident on them. The chlorophyll in green plants is responsible for converting the light energy thus providing a link between the physical world and the biological world. This happens during photosynthesis of food. *The food chain* is a representation of the one-way flow of energy as can be demonstrated in the case of grass being eaten by deer, which in turn, is being eaten by lion, or in the case of algae, consumed by protozoans, consumed by aquatic insects, consumed by small fish which, in turn, are consumed by large fish. The numerous food chains which are interconnected establish a network of species relations, known as *Food Web*. Besides, the different kinds of consumers form a pyramid standing over the producers, connecting all trophic levels. Energy does not flow in a cycle. However, since the source of energy i.e. solar light is inexhaustible, the one-way loss of solar energy is not likely to result in a crisis within a short span of time. However, the loss of energy all along the food path results in a lot of wastage so that only a fraction of energy entering into population is available for transmission to the next population.

Carbon Cycles : Carbon which is found in the atmosphere in the form of carbon dioxide (0.04%) is consumed by producers during photosynthesis or chemosynthesis and is released by them in the form of respiration, combustion and through consumption by consumers. After decomposition, it turns into coal and oil and is finally passed on to the atmosphere through combustion.

Oxygen Cycle : Oxygen which is present in atmosphere (21%) and in water is utilised by plants and animals during respiration but is returned to the atmosphere in the form of carbon dioxide. Besides oxygen is released as a by-product of photosynthesis.

Hydrogen Cycle : Hydrogen which is present in water is split into hydrogen molecules and becomes a component of glucose molecules. After passing through various organs of the body, finally hydrogen is oxidised to form water.

Energy Cycle : The carbon cycle, oxygen cycle and hydrogen cycle of the earth are intrinsically linked with one another through procedures, consumers and decomposers. They may be considered to form a combined cycle of energy. This energy cycle represent the flow of energy in the biosphere.

Nitrogen cycle : Nitrogen is present in atmosphere (78%) and is an essential component of all proteins and nucleic acids. However, nitrogen which is available in atmosphere can be used directly only by a few simple organisms. Conversion of atmospheric nitrogen into inorganic substances like nitrates and nitrites is termed as nitrogen fixation and can be performed only by a few bacteria. Only after nitrogen fixation the green plants can use them in the form of nitrogen assimilation, ammonification, nitrification and de-nitrification. De-nitrification results in the release of nitrogen to the atmosphere.

Bio geo chemical Cycle : The movements of certain elements which are animal and plant nutrients, passing through the atmosphere and living organisms in a cyclic pattern are called bio-geon chemical cycles or cycles of materials.

GENETICS

Origin of life : Before modern times there were different theories regarding origin in life. The theories of origin by Special Creation and origin by Spontaneous Generation may be mentioned in particular. The currently prevalent theory of origin of life is the chemosynthesis theory. According to this, as earth cooled the chemicals in the atmosphere such as water, methane, ammonia, hydrogen and phosphates, combined to form complex molecules of hydrocarbons, amino acids and carbohydrates. In 1950 Stanley Miller was able to demonstrate chemical origin of these simple organic molecules. In course of time the organic molecules should have combined to form large molecules. The formation of molecular com-

plexes such as proteins was the next step. These large molecules developed the property of carrying on metabolic reactions, i.e. break-down and synthesis of energy. The evolution of nucleic acids was the next stage of development. Living organisms should have come into existence on earth about two billion years ago. Of course there are theories which hold that life could not have actually evolved on earth but living organisms were essentially thrown into earth from other heavenly bodies.

Evolution : Cumulative change in the characteristics of organisms which occur in the course of successive generations. The theory of organic evolution holds that the innumerable forms of life which formed on the earth are the result of evolution from simple organisms in the course of millions of years. Lamarck, Wallace and Charles Darwin are the pioneers in the fields of evolution. Lamarck was the first man who used the term 'biology' and gave scientific theory to explain the transmission of characters from one generation to another. He collected some evidences in favour of his theory of evolution. However, it is Charles Darwin who propounded the theory of evolution, in a striking form, after having undertaken voyages in the ship HMS Beagle and having collected sufficient fossil specimens. His theory is outlined in the book 'Origin of Species by means of natural selection'. The chief elements of his theory are variation, struggle for existence, survival of the fittest and natural selection. Variation is the genetic property according to which no two offsprings are exactly alike. Struggle for existence is the result of prolific production of offsprings. It finally ends in the survival of the fittest and the elimination of the weak. Environment plays an important part in this. Natural selection means that nature selects certain forms for survival because they are fit to live in the environment. Natural selection operates in favour of evolution of superior forms and eliminates weaker forms. Evolution takes place at the level of population, not at the level of the individuals. Evolution is still in operation. Details of Darwin's theory have been modified in the light of the latest finding but the basic principles of his theory remain valid.

Evidences of evolution are found in the form of fossils ; in the study of anatomy, physiology, and embryology ; and in the geographical evidences. Fossils are remains of entire organisms or their parts, found preserved in rocks strata over millions of years. It is found that fossils are more numerous in the upper layers than in the lower layers and that the fossils of lower layers are simpler organisms than those of the upper layers. The study of fossils leads to the conclusion that living forms with simpler organisation appeared earlier than the complex forms and that some living forms which were once found on earth are now extinct. Study of comparative anatomy provides much evidence in favour of evolution. Homologous organs found in certain animals have similar origin but may be functionally different. These organs prove the common ancestry of different kinds of animals. The study of physiology shows that organs become more and more complex as you pass from simple organisms to complex life forms. Certain human organs are vestigial in man while they are functional in other animals, e.g. ear muscle, third eyelid, appendix etc. Study of embryology shows that the embryonic forms of different organisms evolve from the same simpler life forms, e.g. human embryo passes through a stage resembling the embryo of fish. Geographical evidence show that a particular kind of environment favours certain organisms and causes the extinction of other organisms which are not favoured by the hostile environment.

Mendel's Laws of Heredity : Gregor Mendal of Austria is the father of genetics. His two laws that explain the role of heredity in reproduction are the law of segregation of characters and the law of independent assortment.

Adoptation : Is the trait of an individual organism to survive untill it attains reproductive maturity. Adoptation is essential for the success of an individual within a species.

Heredity : The link between generations of a family. Genes are the hereditary units that are transmitted to the offsprings during re-production. The dissimilarities in the offsprings of the same parents are called variations. A variation may be environmental or hareditary.

Phenotypes : The various internal and external features of a particular living organism that are characteristic of that organisms alone:

Genotypes : The typical traits passed on from generation to generation through genes. While phenotype may be affected by environment, genotype is not normally affected. However, genotypical changes may occur due to reshuffle of genes during meiosis, doubling of chromosomal number, increase or decrease of chromosomal number of mutation, Gene mutation may cause hereditary disorders such as colour blindness, albinism and haemophilia.

Dioxyribo Nucleic Acid (DNA) : This is a chemical substance which is a basic constituent of living matter. A nucleic acid is a polynucleotide chain of large molecules. Each nucleotide consists of a purine or pyrimidine base, pentose (sugar) and a phosphate. DNA exists as a double chain, the base of one chain being joined with the bases of the others, thus forming a spiral ladder-like structure called double helix. The purine bases consists of adenine (A) and guanine (G). The pyrimidine bases are cytosine (C) and thymine (T). The (pentose) sugar that a found in DNA is dioxyribose'

Reproduction of DNA : Just before cell division, DNA molecule replicates itself. The two strands of the helix separate and for each of them a complimentary strand occurs so that ultimately two DNA molecules are synthesised. This semi-conservative mode of DNA replication was proposed by Watson and Crick. Experiments of chromosome duplication have shown that radioactivity on the parent DNA molecule is distributed to half of the offsprings, leaving the remaining half unaffected by radioactivity. The genetic information which is stored in the DNA is passed on to the other parts of the cell through RNA (Ribo Nucleic Acid). During protein synthesis, DNA acts as a template initiating a series of processes at the end of which a complete polypeptide is synthesised and released. The process of RNA synthesis on a DNA template is called *transcription* and synthesis of protein according to message contained in RNA is called *translation*.

The language of code of DNA is written with four letters A, T, G, and C. A sequence of three bases which stands for an *amino-acid* is called a code word or *codon*. The four bases give rise to 64 possible codons i.e. amino acids. But since there is repetition, we get only 20 essential amino acids. *Cistron* is a unit of information in the DNA code. The DNA segment which is bounded by a start and a stop signal and which contains enough information for one complete RNA molecule, is called *cistron*. A group of functionally related *cistrons* is called a *Gene*, a unit of hereditary information.

Internal Structure of Organism

Cell All plants and animals are composed of cells. The cell theory states that all cells come only from pre-existing cells. Cytology, the study of cells, has made tremendous progress during the last few decades by the use of new tools such as electron microscope, ultracentrifuge etc., and now the structure of the cell is thoroughly known. Different parts and components of the cell perform different functions. A cell is composed of a substance called *protoplasm*, which exhibits all the basic properties of life such as metabolism, irritability and reproduction. Protoplasm keeps changing its composition and activities from moment to moment and thus performs the life processes. Different molecules—proteins, carbohydrates, fats, vitamins and nucleic acids are arranged in the protoplasm, thus providing the *molecular organisation* of life. Different parts of a cell are plasma membrane, cytoplasm, nucleus and cell organelles. The most important part of the cell is the *nucleus* made of nucleoproteins and nucleic acids.

The nucleus may be spherical or oval in shape and may be located either near the centre or to a side of a cell. It is responsible for controlling the cell metabolism. Within the nucleus the most important structures are *chromatins* which develop into *chromosomes* during cell division. DNAs are found in chromosomes and hence these are responsible for hereditary characters. Nucleus containing RNAs are also found within the nucleus. 'Organelles' is a common name for a number of small bodies and particles found embedded in the cytoplasm of a cell. They are responsible for perform-

ing different vital functions of the cell. *Cytoplasm* is the name given to a viscous jelly-like substance in which the organelles and the nucleus are embedded. The plant cells are covered by rigid cell walls, whereas in animal cell only the thin cell-membrane cover the matter inside the cell.

Cell Division : The most important function performed by a cell is self-duplication. There are two types of cell division—Mitosis and Meiosis—through which cell duplicates itself. Mitosis is the mode of reproduction in many uni-cellular organisms and also occurs as a process in multi-cellular organisms in the case of healing of wounds, regeneration of cells after the normal wear and tear etc. In mitosis, a single cell splits into two daughter cells. The splitting occurs first in the nucleus and is carried forward to the entire cell.

Meiosis is the process of cell division which occurs in complex animals. In this case each cell gives rise to four daughter cells by two successive divisions. The daughter cells are the mature male gametes (sperm) or female gametes (ovum), as the case may be. These daughter cells contain only half of the normal number of chromosomes so that they may later unite to form a cell with the characteristic full number of chromosomes. It is worth noting that the chromosomes of the daughter cells are qualitatively different from those of the parent cells. This explains why all the offsprings display characteristics different from those of parents. This chromosomal variation produces diversity among the individual of the same species.

Tissues : A large number of cells having similar origin, structure and functions form a group called a tissue. There are several kinds of tissues which work out a division of labour in the organisms. The plant tissues are categorised into meristematic and permanent tissues. There are five main types of animal tissues—epithelial, muscle, nerve, connective and reproductive. Epithelial tissues are found in the skin, alimentary canal, lungs etc. Muscle tissues are found all over the body, in particular, in the heart and alimentary canal and are responsible for body movements. Nerve tissues comprising nerve cells called *neurons*, are found in the brain, spinal cord and the nerves. Connecting different tissues.

are found in bone, cartilage, tendons, blood, etc. Reproductive tissues are found in the reproductive organs.

Organs : Several kinds of tissues combine together to form an organ in an organism. An organ performs a definite set of functions in the body. Well-known examples are the brain, eye, ear etc.

Organ systems : A set of organs together are responsible for a life process essential for the survival of an organism. This set is called organ system. There are to organ systems in plants and several in animals.

Organisation within Organism

An organism, considered as an individual, is a member of a higher unit i.e. species. However, an organism itself is a complex and self-contained system in which life is maintained through life processes within the organism. Organism have been organised at various levels. As the level increases, the organism become more and more complex.

Uni-cellular Organisms : An organism organised at the cellular level is called a uni-cellular organism. The entire organism consists of a single cell which performs the vital life processes for its survival. e.g. Amoeba is a single cell in which the different organelles perform the vital functions of ingestion, digestion, absorption and egestion. Paramecium is another uni-cellular organism.

Tissue level organism : Certain plant organisms such as algae, Spirogyra and Ulothrix consist of single tissues. Hydra is an animal organised at the tissue level.

Organ-level organisms : Organ is the next higher level of organisation of matter in a living form. An organ performs a set of functions which are essential for life in the organisms.

Organ System level organisms : Most of the plants and animals are organised at the level of organ systems. In the case of plants, only two organ systems are found but animals have many organ systems. The lower-level animals like worms may have a few organ systems, but all the higher-level animals have ten organ systems. We give below the important organ systems, their components and the main functions performed by them.

<i>Organ System</i>	<i>Important Organs</i>	<i>Main functions</i>	<i>Remarks</i>
<i>Plants</i>			
Shoot System	Stem	Support to the plant. Conduction of water and minerals from the root to leaves and transport of prepared food from the leaves to the other parts. Storage for food	e.g. sugarcane and Ginger. e.g. Cactus
	Leaves	Synthesis of food Food synthesis (photosynthesis) respiration. Transpiration.	
Root System	Root	Holding the plant firmly to the ground.	
	Root hairs	Storage of food,	e.g. Carrot and Radish
	Flowers	Absorption of water and other minerals from the soil.	
	Fruits	Reproduction.	

<i>Organ System</i>	<i>Important Organs</i>	<i>Main functions</i>	<i>Remarks</i>
<i>Animals</i>			
Integumentary System	Skin and its derivatives	Protection of the organism from environment.	
	Sweat Glands	Maintenance of body temperature.	
Skeletal System	Bones, Cartilages	Support to the body. Protection of the body especially certain vital organs	
Muscular system	Muscles		
	Voluntary muscles	Movement of parts of the body Locomotion.	
Alimentary System (Digestive System)	Involuntary muscles	Maintaining body rhythm	e.g. Cardiac muscles
	Mouth (Saliva)	Ingestion of food. Breaking down starch	
	Tongue	Speech, taste	
	Oesophagus		
	Stomach (Gastric juice)	Breaking down proteins	
	Small Intestine		
	(Intestinal juices)	Final digestion of all food	

<i>Organ System</i>	<i>Important Organs</i>	<i>Main functions</i>	<i>Remarks</i>
Respiratory System	Valves Lymph	Ensures one way traffic of blood. Supplies food and oxygen to tissues collects wastes from tissues.	Aerobic respiration for all animals which inhale free oxygen. Anaerobic respiration for a new bac- teria which do not con- sume free oxygen.
	Lungs	Fights disease-causing organisms.	
	Gills	Breathing i.e. inhaling oxygen and exhaling carbon dioxide. For respiration in the case of fish.	
Excretory System	Kidney	Removal of body wastes. Remove waste products from blood such as Ammonia, urea through urin.	Regulates the loss of water from the body. Maintains the acidity level of the body.
	Lungs	Removal of Carbon di oxied.	
Nervous Sytem	Large Intestine	Excretes wastes from the stomach	Regulates internal operations and responses to external environment through sense oagans.
	Liver	Excretion of bile	

<i>Organ System</i>	<i>Important Organs</i>	<i>Main functions</i>	<i>Remarks</i>
Endocrine System	Brain	Maintains metabolic harmony and homeostatic through hormones, secreted by different glands. Controls the production of pituitary glands	Located near brain
	Nerves		
	Spinal Chord		
	Sense Organs : Eyes ears, nose, tongue, skin		
	Hypothalamus	Secretes many hormones necessary for growth, reproduction and metabolism	Located just below hypothalamus.
	Pituitary	Secretes insulin which regulates the amount of sugar in the blood.	Located near stomach
	Pancreas	Secretes thyroxin which controls the rate of metabolism and body growth.	Located near neck
	Thyroid	Secretes hormones to regulate the calcium level of blood	Located near neck
	Parathyroid		

<i>Organs System</i>	<i>Important Organs</i>	<i>Main functions</i>	<i>Remarks</i>
Reproductive System	Pincal Gland	Secretes hormones to regulate other hormones and the size of blood vessels	Located near brain.
	Adrenal Glands	Secrete adrenalin which regulates metabolism of carbohydrates, fats, proteins and blood pressure.	Located near kidneys
	Ovaries	Secretes hormones that regulate the reproduction process.	Female organ
	Teste	Secrete hormones that regulate the reproduction process.	Male organ
	Male and Female sex organs	Reproduction.	

Animal Husbandry

Cattle and Buffalo : In India bullock is useful as a draught animal for tillage, irrigation and carting. Cows are useful for milk production. Thus cattle (cows and bullocks) are the foundation of agriculture in India. well-balanced daily diet of a person in India should contain 283 grams of milk along with other animal proteins. The cattle droppings are an important source of manure for the soil. Cow dung is universally recognised as superior to chemical fertilisers for the retention of humus in the soil and for maintaining its fertility. The annual production of cattle manure in India is about 1200 million tonnes. However, a bulk of this is lost because of burning of cow dung as a fuel. Cattle are the major source of hides and skins which India exports in sizable quantities. Bone meal prepared from dead animals is an important manure supplement in cattle and poultry feeds and as a fertiliser. The cattle population of India is nearly $1/5$ th of the total cattle population in the world.

There are 24 breeds of cattle and six breeds of buffalo in India. Besides we find a large number of nondescript cattle in India. Indian cattle of good breeds are concentrated in dry areas such as Punjab, Haryana, Rajasthan, Tamil Nadu, Karnataka, Andhra Pradesh and parts of Gujarat and Maharashtra. In hilly and coastal areas and areas of heavy rainfall only uneconomic classes of cattle are found. Thus a direct relationship can be established between good quality cattle and dry areas. Nearly 25% of the cattle population in India is good according to breeding standards.

Given below are the important breeds of cattle with the area where they are found in concentration and the main utility of the animals :

Kankrej : Gujarat. Draught breed.

Hissar : Haryana. Draught breed.

Kenwariya : Uttar Pradesh and Madhya Pradesh. Draught breed.

Kherigarh : Uttar Pradesh. Draught breed.

Malvi : Madhya Pradesh and Andhra Pradesh. Draught breed.

Tharparkar : Pakistan, Gujarat and Rajasthan. Milch and draught breed. One of the best breeds in India

Bachaur : Bihar. Draught breed.

Gaolao : Madhya Pradesh. Draught breed.

Hariana : Haryana. Draught and milch breed.

Krishna Valley : Maharashtra and Andhra Pradesh. Milch breed.

Mewati : Rajasthan. Draught breed.

Nagori : Rajasthan. Draught breed.

Ongole : Andhra Pradesh, Milch and draught breed.

Rathi : Rajasthan. Draught breed.

Dangi : Maharashtra. Milch breed. Good for areas with heavy rainfall.

Deoni : Andhra Pradesh. Milch cattle.

Gir : Gujarat, Maharashtra and Rajasthan. The one of the best milch breed.

Sahiwal : Pakistan.

Hallikar : Karnataka. Draught breed, Poor milker.

Alambadi : Tamil Nadu. Poor milker.

Amritmahal : Karnataka. Draught cattle, poor milker.

Bargur : Tamil Nadu. Draught cattle, poor milker.

Kanjavam : Tamil Nadu. Draught breed, poor milker.

Khillari : Maharashtra. Poor milker.

The important breeds of buffalos found in India are the following :

Jaffarabadi : Gujarat. Milch animals.

Mehsana : Gujarat. Milch animals.

Nagpuri : Maharashtra and Madhya Pradesh. Draught animals.

Surti : Gujarat. Good milkers with high fat content.

Murrah ; Punjab and Haryana. Milch animals.

Nili and Ravi : Pakistan, Haryana and Punjab. Milch animals.

In India bullocks are good working animals, but cows are uneconomic milk producers. Haryana and Tharparkar are the main breeds which are dual purpose animals i.e. females are good milk producers and males are good draught animals. The milk-producing capacity of an animal depends on its pedigree. If the environmental conditions are not good the production will be less than the inherited capacity. The milk yield of a cow rises to the maximum in about six weeks after calving and gradually declines. The milking capacity of a cow is the total yield from the day of calving to that of drying. The cows remain in milk for 8.8 months and buffalos for 9.9 months. The average calving is 18 months for both cows and buffaloes. If cows are served shortly after calving instead of when they become dry or near dry, they would be more profitable to maintain. They will produce more calves and there will be substantial increase in their total milk yield. The cow's ration should be increased progressively with advance in pregnancy. About a month before the date of calving the production ration should be approximately equal to its ration after calving. The period of gestation is about 300 days for a buffalo as against 280 days for cattle. A well cared-for Indian bull is ready for service at the age of 2½ years. The normal period for cattle to come in heat is 21 days and best time to serve a cow is during last stage of heat. By natural mating, a buffalo can produce about 60 calves in a year where as, by artificial insemination, it can produce 5000 calves.

Sheep : Sheep have a unique place among domestic livestock since they are reared for various purposes and can be maintained under different environmental conditions. One of the main uses of sheep is wool gathering. Indian sheep are useful only for carpet wool whereas a bulk of the sheep in the world produce wool for textiles. India is sixth in sheep population. The sheep droppings are very good manure since the percentage of phosphate and potassium is nearly twice that in cattle manure. In India sheep are reared mainly in four regions—Temperate Himalayan region, consisting of

Jammu and Kashmir, Himachal Pradesh and Uttar Pradesh ;
 Dry Western region consisting of Rajasthan, Punjab, Haryana,
 Western Uttar Pradesh, Gujarat and Madhya Pradesh,
 Southern region consisting of the drier areas of Deccan,
 Eastern region where only a small quantity of sheep are found.

The normal life span of a sheep is 10 to 12 years. The ewes (female sheep) generally mature for mating at 9 to 14 months. Sheep are normally productive upto seven years. The age of a sheep is indicated by the number and conditions of teeth. The pregnancy period of ewes is roughly 150 days. In India there are three main breeding seasons for sheep—summer (March-April) ; Autumn (June-July) ; and winter (October-November), Ram (male sheep) can be used for mating upto 40 ewes in a breeding season. A sturdy lamb will rise on its legs within a few minutes of his birth. For mating of sheep different methods are used—In-breeding and cross breeding. In-breeding is the mating of closely related animals. In-breeding brings out the undesirable characters which otherwise would have remained obscure. Thus inbreeding is useful to develop uniform and distinct families. Line-breeding is a less intensive form of inbreeding. Cross-breeding is done for developing new breeds, for obtaining commercial stocks and for grading.

Sheep is a *ruminant* animal, i.e. the food stored in the stomach is again transferred to mouth for rechewing. Sheep chew the food more thoroughly than cattle. Sheep generally survive on natural grass, shrubs and farm wastes, and do not elish concentrates. The main products of sheep are wool, mutton and skin.

Goat : Goat is a versatile animal, known as 'the poor man's cow' in India and as 'wet nurse' in Europe. India has nearly 1/4th of the total goat population of the world. The goats are round in all parts of India, but Rajasthan tops the list followed by Uttar Pradesh, Bihar and Madhya Pradesh. A state surprisingly having no goat population is Karnataka. There are 13 well-known Indian breeds. The age of a goat is determined from its front teeth on the lower jaw.

There are no teeth on the upper jaw. The male goats are raised mainly for meat and not for breeding. So they are castrated so as to improve the flesh of buck (male goat). Hoof trimming is necessary for the well-being of goats. Selection of the doe (female goat) is important for a productive herd of goats. Goats are mainly meant for slaughter and become ready for meat when three months old. The period of heat in a doe varies from 18 to 21 days. The average gestation period for the doe is 150 days. It is better to breed a doe once a year. An average goat can rear well two kids, but some goats are known to give birth to as many as five kids at a time. The incidence of twinning varies with breed, environment and number of kiddings.

Goats are very wasteful and refuse to eat what is dropped down on the ground. They are fastidious about cleanliness and like frequent change in the feed. Goats are ruminants and are fond of leguminous fodder and do not relish sorghum, maize or straw.

The main goat products are milk, meat, skin and manure. Goat milk is cheap, wholesome, easily digestible and nutritious. It is recommended for use in the case of dyspepsia, peptic ulcer etc. In India goat meat is preferred to mutton. Best meat is obtained from goats 6 to 12 months old. India is the single largest goat skin producing country in the world. Different types of hair of goat are obtained in India. Goat manure is good for soil. The goat droppings are much richer in nitrogen content and phosphoric acid than those of cattle. Goat urine is more valuable than that of any other animal in contents of nitrogen and potash.

Poultry : The term poultry includes fowls, ducks, geese, turkeys and pigeons in a broader sense. But in most cases poultry refers to fowls (chicken). For a balanced diet in India half an egg per day is prescribed. The egg production in India is much less than the minimum requirements according to the nutrition standards. Till very recent time poultry was not properly developed in India. The main advantages of poultry farming are : small initial investments ; quick return ; requirements of only a small area ; use of various by-products

unfit for human consumption as feed stuff; easy to look after. The well-known breeds of fowls are foreign in origin. The main Indian breed of international standard is the Brahma breed found in Brahmaputra region of India. Another Indian breed very much in demand is Aseel. A cock normally weighs about 4 kg. In poultry farming it is uneconomical to keep males of egg-type breeds. So only female chicks are generally purchased and male chicks are destroyed.

A hen can transmit sex-linked character to its son but not to its daughter. But the cock can transmit the same characters to the son and the daughter alike. In poultry breeding the methods followed are inbreeding, out-crossing, grading and cross-breeding. The main object of inbreeding of fowls is to have Indian-bred lines which, when crossed, will give progeny of good quality. Such breeds are called in-bred hybrids. Out-crossing is the mating of individuals of two different strains of the same breed. Grading is the mating of a mixed mongrel flock with pure bred males of an improved breed. The offsprings of such mating are called grades. Cross-breeding is the mating of individuals belonging to two different breeds. It results in better hatchability of eggs and growth of chicks. Hatchability is defined as the percentage of fertile eggs which are hatched. The production capacity of a hen can be judged from moulting i.e. the time and rate of dropping old feathers. There are ten flight feathers in a fowl. The hens which start laying earlier, lay more eggs than the late-maturing ones. Normally hens start laying from the 5th month. Egg cycle is the number of eggs laid without break of continuity. A good layer will lay first egg fairly early in the morning and lay the next egg a little latter on the next day and continue thus till she reaches the late evening period, In poultry farming the most commonly used system is strain crosses.

For hatching of eggs in poultry farms incubators are commonly used nowadays. The best storage temperature is 10 to 13°C. Temperature is the most important factor in deciding hatching, the others being humidity, ventilation and turning of eggs. An egg with dead embryo will be transparent when

placed before the candling light. The sexing of chicks is done by identifying a small rudimentary organ in the cloaca in male chicks. The most commonly used poultry feed is maize, which is a source of energy but low in protein. Rice polish is a good substitute for cereal grains in poultry ration. Fish meal is one of the best poultry feedstuff and is a rich source protein. The three visible parts of an egg are shell, yolk and white in the proportions of 11 : 30 : 59 (by weight) the percentage composition of the egg are water 66%, protein 13%, minerals 1% fat 10%.

Animal Diseases : (i) Pox of Cows, buffaloes, sheep, goats and fowls (viral) (ii) Dermatitis of goats and sheep (viral) (iii) Tuberculosis of cattle and fowls (bacteria) (iv) Rinderpest (cattle plague) of cattle, buffaloes, sheep, goats, pigs (viral) (v) Foot and mouth disease of all cloven-footed animals (communicable viral) (vi) Rabies (viral) (vii) Ranikhet of poultry (communicable viral) (viii) Marck's disease of poultry (viral) (ix) Anthrax of all animals (bacteria) (x) Johne's disease of cattle (bacteria) (xi) Haemorrhagic Septicaemia of cattle and buffalo (bacteria) (xii) Foot rot of sheep (bacteria) (xiii) Black Quarts of cattle (bacteria).

QUESTIONS

1. How is the weight of a body different from its mass ?
 - (a) Mass is constant whereas weight is variable.
 - (b) Mass is variable but weight is constant.
 - (c) Mass is found inside a body whereas weight is there outside.
 - (d) Mass is an intrinsic property of the body whereas weight is a force. (1979)
2. Why is it easier to roll a barrel along the road than to pull it along the road ?
 - (a) The full weight of the barrel comes into force when it is pulled.
 - (b) Rolling friction is much less than sliding friction.
 - (c) In the case of rolling, only one point of the barrel is in contact with the earth, whereas the full base is in contact with the earth in case of sliding.
 - (d) None of the above explanations is correct. (1979)
3. Why does a body weigh slightly more at the poles than at equator of the earth ?
 - (a) The earth is flat at the poles.
 - (b) The earth has the maximum speed of rotation at the equator.
 - (c) The poles have their attractive force reduced because of deep ice.
 - (d) None of the above explanations is correct. (1979)
4. Why does a steel solid ball float on mercury ?
 - (a) Mercury will not allow any body to sink.
 - (b) Mercury is a solid for all practical purposes.
 - (c) The density of mercury is higher than that of steel.
 - (d) Steel ball can be made to float on any liquid by suitable construction. (1979)

5. Why does a football bounce when it falls on the ground ?
- (a) Since it is made up of rubber.
 - (b) Since it is hollow.
 - (c) Since it is very light and hence able to overcome the resistance of the air.
 - (d) Because of its property of elasticity. (1979)
6. Why does the water surface in an open pond remain cool even on a hot summer day ?
- (a) Evaporation at the surfaces causes cooling.
 - (b) The heat absorbed at the surface is passed on to the bottom.
 - (c) Natural water cannot become hot.
 - (d) Because of the convection currents set up inside the water. (1979)
7. Why does it take longer to cook anything in the hills than in the plains ?
- (a) In the plains, atmospheric pressure is low and so the boiling point of water is lowered, facilitating quicker cooling.
 - (b) The atmospheric pressure is lower in the hills than in the plains and so water boils at the lower temperature, thereby reducing the heat content.
 - (c) The atmosphere in the hills is generally damp and does not allow burning easily.
 - (d) The weight of any body in the hills is lower than that in the plains and hence absorbs more heat. (1979)
8. When a straight stick is partly immersed in water, the immersed portion appears bent
- (a) towards the bottom
 - (b) towards the water surface.
 - (c) in a zigzag manner.
 - (d) down-ward. (1979)
9. Why does radio reception improve slightly during the night ?

- (a) The outside noise is reduced very much during nights.
- (b) Unlike during the daytime, only a few radio station broadcast during the night.
- (c) The sunlight affects the radio broadcasts to some extent during the daytime.
- (d) The magnetic field of the earth functions with reduced intensity during the night, thereby reducing its impact on the broadcasts. (1979)
10. The study of materials and phenomena at temperatures close to absolute zero is known as
- (a) cyrogenics (b) cyrogenics
(c) cytogenics (d) acoustics (1979)
11. What is the function of a moderator in a nuclear reactor.
- (a) To reduce the speed of the neutrons.
- (b) To moderate the number of neutrons that will be formed in the reactor.
- (c) To regulate the number of the nuclei that split on the impact of neutrons.
- (d) To take out the heat of the fission reaction from the reactor. (1979)
12. What is the main source of energy supply to the sun and the stars ?
- (a) Nuclear fission.
- (b) Nuclear fusion
- (c) Heat energy that is already there.
- (d) Mechanical energy in the form of rotation, (1979)
13. What is meant by galvanization ?
- (a) The process of attraction of a weak element by a strong element because of the electromagnetic forces.
- (b) The process of changing iron into steel.
- (c) The process of making a substance harder by the addition of zinc.
- (d) The process of covering iron sheets with zinc in order to prevent corrossion. (1979)

14. Cellulose is obtained from
(a) rubber and wood. (b) wood and cotton.
(c) wood and silk. (d) silk and cotton. (1979)
15. Which part of the blood is responsible for protection of body against disease and infection ?
(a) Red blood cells. (b) White blood cells.
(c) Haemoglobin (d) Blood platelets. (1979)
16. Bacteria and fungi are important
(a) producers of the community.
(b) carnivores consumers of the community.
(c) herbivores consumers of the community.
(d) decomposers of the community. (1979)
17. What is the main use of Vitamin E ?
(a) To prevent harmful oxidation.
(b) Proper bone formation.
(c) A healthy nervous system.
(d) Proper clotting of blood. (1979)
18. Bile is secreted by
(a) Small intestines. (b) Lungs.
(c) Liver. (d) Pancreas (1979)
19. B.C.G. is
(a) a curative medicine for tuberculosis.
(b) a preventive medicine for tuberculosis.
(c) a disinfectant.
(d) an antiseptic. (1979)
20. In the temperate zones of the earth
(a) the sun never comes to the zenith point at any place in the course of a year.
(b) there is perpetual winter.
(c) the Midnight sun is seen.
(d) population density is very low. 79
21. Solar eclipses
(a) occur on full moon days during daytime.
(b) are rare phenomena. When they, partial eclipses, are visible only in limited parts. (1979)

- (c) are accompanied by mysterious occurrences on the earth.
- (d) occur much less frequently than lunar eclipses. (1979)
22. The crop which is sown with the commencement of monsoon is
- (a) rabi crop. (b) kharif crop.
- (c) cash crop. (d) summer crop. (1979)
23. 'Jhum cultivation' is connected with
- (a) tribal people (b) delta cultivation.
- (c) dry farming (d) hilly people. (1979)
24. The crop which grows in alluvial soil and needs 150 cm rainfall is
- (a) wheat (b) rice
- (c) groundnut (d) barley (1979)
25. Which of the following crops helps in nitrogen fixation?
- (a) Rice (b) Wheat
- (c) Maize (d) Beans (1979)
26. Which of the following is a balanced nutrient for plants?
- (a) Urea (b) Ammonia Sulphate
- (c) Nitrates (d) Compost (1979)
27. The two branches of a plant give two different fruits : tomatoes and brinjals. This can be explained
- (a) by hybridization.
- (b) by grafting one with other.
- (c) by Nature's freak.
- (d) by (a) and (c) mentioned above. (1979)
28. Feeding of milk cattle with cotton seeds
- (a) increases fat content temporarily.
- (b) decreases fat content temporarily.
- (c) may decrease or increase fat content.
- (d) causes no change in fat content. (1979)
29. After hatching by the hen, the young chicks come out of eggs within
- (a) one week (b) two weeks
- (c) three weeks (d) four weeks (1979)

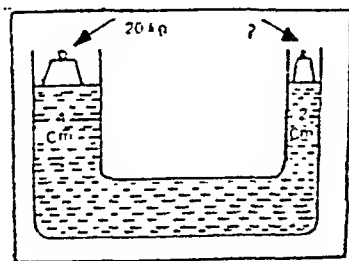
30. In which of the following States is the yield of forest wealth per hectare of forest maximum ?
(a) Tamil Nadu (b) Madhya Pradesh
(c) Tripura (d) Kerala (1979)
31. Age of a tree can be determined
(a) by counting the number of rings.
(b) by thickness of the bark.
(c) by the bulk of the tree.
(d) by the number of leaves. (1979)
32. The first metal used by man was
(a) iron (b) copper
(c) aluminium (d) gold. (1979)
33. Gobar gas contains mainly
(a) carbon dioxide (b) methane
(c) ethylene (d) carbon monoxide. (1979)
34. The most common substance responsible for pollution is
(a) smoke (b) carbon dioxide
(c) sulphur dioxide (d) carbon monoxide (1979)
35. In summer, man with excessive perspiration feels weak, because of the
(a) loss of much water through evaporation.
(b) loss of salts through evaporation.
(c) loss of carbohydrates through evaporation.
(d) all the factors mentioned above. (1979)
36. When light enters a closed room through a small hole in the door, the image of an outside building appears as inverted on the opposite wall. This is because
(a) the hole acts as a convex lens.
(b) light takes a curved path at the edges of the hole.
(c) of rectilinear propagation of light.
(d) the whole acts as a concave lens. (1979)
37. The density of sea water increases as
(a) depth and salinity increases.
(b) depth decreases and salinity increases.
(c) depth increases and salinity decreases.
(d) depth and salinity decreases. (1979)

38. When wood is lighted
(a) Smoke comes out.
(b) CO_2 comes out.
(c) CO comes out.
(d) None of these happens. (1979)
39. The element which has the same atomic number and atomic weight is
(a) hydrogen (b) helium,
(c) oxygen (d) nitrogen 1979)
40. Water consists of hydrogen by weight in the ratio of
(a) 2 : 1 (b) 1 : 16 (c) 2 : 16 (d) 1 : 32 (1979)
41. The supersonic jets tend to cause
(a) destruction of ozone layer.
(b) sound pollution
(c) breakdown of nervous system in living things.
(d) all of the above. (1979)
42. Why is it more difficult to walk on ice than on concrete ?
(a) There is less friction on ice than on concrete.
(b) There is more friction on ice than on concrete.
(c) Ice is soft compared to concrete.
(d) None of the above is the reason, (1979)
43. Pulse reading is done by doctors to find out
(a) temperature. (b) heart beat.
(c) blood pressure.
(d) respiration rate. (1979)
44. If a large number of people are enclosed in a room then
(a) oxygen decreases and carbon dioxide increases.
(b) oxygen increases and carbon dioxide decreases.
(c) both oxygen and carbon dioxide decreases
(d) both oxygen and carbon dioxide increase. (1979)
45. It is not advisable to sleep under a tree at night because of the
(a) release of oxygen in lesser amount.

- (b) release of oxygen in larger amount.
 (c) release of carbon monoxide.
 (d) release of carbon dioxide. (1979)
46. Which of the following forms a part of Darwin's theory ?
 (a) Survival of the fittest and struggle for existence.
 (b) The weak and the strong always maintain a fixed proportion
 (c) Different species do not arise by genetic mutation.
 (d) None of the above. (1979)
47. The bats can fly in the dark because
 (a) They have a better vision in dark.
 (b) the light startles them.
 (c) they produce ultrasonic waves.
 (d) any bird can do so. (1979)
48. Carbohydrates, proteins, and vitamins which are responsible for energy, growth, and vitality are obtained respectively from
 (a) cereals, milk, and vegetables.
 (b) milk, pulses, and cereals.
 (c) milk, pulses, and vegetables,
 (d) pulses, vegetables and cereals. (1979)
49. Richter scale is used to measure.
 (a) earthquakes. (b) ocean depth.
 (c) intensity of wind.
 (d) temperature of the body. (1979)
50. In India the incidence of malaria has been increasing recently because
 (a) the mosquitoes have increased enormously.
 (b) of poor sanitary conditions in villages.
 (c) preventive measures have been neglected owing to the enormous cost of the operations.
 (d) the mosquitoes have become DDT-resistant. (1979)
51. People suffer from anaemia owing to lack of
 (a) iron (b) calcium
 (c) iodine (d) potassium (1979)

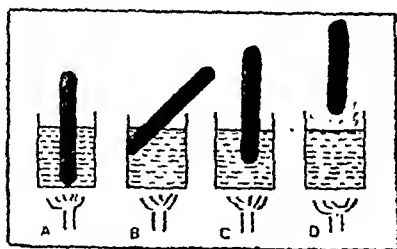
52. Reserpine is used to
(a) reduce high blood pressure.
(b) increase blood pressure when it is low
(c) alleviate pain.
(d) cure arthritis. (1979)
53. Dialysis is used in the case of a patient suffering from
(a) liver trouble.
(b) kidney trouble. (c) lung affection.
(d) cataract. (1979)
54. Which are the three disease against which a child should be nowadays immunized through triple antigen ?
(a) Tuberculosis, whooping cough, and cholera.
(b) Whooping cough, small-box, and tetanus.
(c) Whooping cough, tetanus, and tuberculosis.
(d) Whooping cough, diphtheria and tetanus. (1979)
55. Many gadgets from the same outlet of electricity are not recommended since
(a) Only one gadget should be used at a time.
(b) This will result in short circuit.
(c) Voltage may be reduced.
(d) There is the risk that all gadgets will be affected if one gadget fails. (1981)
56. If water is cooled from 10° to 0°C , what happens ?
(a) Its volume decreases up to a certain extent and then increase.
(b) Its density decreases up to a certain extent and then increase.
(c) Its volume decreases uniformly.
(d) Both its volume and density increase. (1981)
57. If water were to behave like other liquids while cooling
(a) It would freeze from top to bottom.
(b) It would freeze from bottom to top,
(c) It would freeze uniformly and simultaneously at all levels.
(d) It would freeze all of a sudden. (1981)

58. When ice floating on water in a glass tumbler melts, the level of water in the tumbler
(a) Increases (b) Decreases
(c) Remains the same
(d) Rises and falls alternately. (1981)
69. Food is cooked in a pressure cooker because
(a) Temperature increases quickly.
(b) Boiling point of water is raised.
(c) Steam causes high pressure.
(d) Steam is not allowed to escape. (1981)
60. Why does the volume of rice increase as it is cooked ?
(a) Rice, like any other solid, expands in volume in volume with increase of temperature.
(b) All foodgrains increase in volume as they are cooked.
(c) Since rice is cooked in plenty of water, its volume increase
(d) Starch in the rice absorbs water. (1981)
61. What amount of weight will be required to counter-balance 20 kg as shown in the diagram ?
(a) 10 kg (b) 20 kg
(c) 40 kg (d) 5 kg. (1981)



62. When bread is baked, its volume increases because of
(a) Capillary action of water.
(b) Wheat cooked twice.
(c) Carbon dioxide released by yeast.
(d) The huge quantity of water mixed with flour (1981)

63. Maximum water vapour content in a parcel of air
 (a) Increases with decrease in temperature
 (b) Decreases with increase in temperature.
 (c) Decreases with decrease in temperature
 (d) Does not change with variation in temperature. (1981)
64. Camphor left on a plate exposed to air disappears because
 (a) It evaporates.
 (b) It reacts with gases in the atmosphere.
 (c) It reacts with the plate and dissolves.
 (d) It undergoes chemical decomposition. (1981)
65. Which of the following is common to all acids ?
 (a) oxygen (b) Chlorine
 (c) Sulphur (d) Hydrogen (1981)
66. Which is the essential component needed for the formation of oxides ?
 (a) Oxygen (b) Hydrogen
 (c) Nitrogen (d) Chlorine (1981)
67. Which of the following positions of the thermometer will show the correct temperature if the water is boiling at 100°C ?
 (a) A (b) B (c) C (d) D (1981)



68. Solar lamps have been, for the first time, set up in India is
 (a) Ladakh (b) Rajasthan.
 (c) Trivandrum (d) Gujarat. (1981)

69. Which of the following gives the correct order in which things flow from the interior of the earth from top to bottom when earth is drilled ?
(a) Natural gas, oil water.
(b) Oil, natural gas, water,
(c) Water, natural gas, oil
(d) Wather, oil, natural gas, (1991)
70. Stripes in certain anumals are meant
(a) to induce mating habits.
(b) to help them through comoufiage.
(c) to make them easy prey to predators.
(d) to make them specially beautiful. (1991)
71. Dehydration of fruits is done before tinning them for food. This is
(a) to add to them nutritents in the fruit.
(b) to reduced their weight.
(c) to prevent microbial growth.
(d) to preserve the essence in full strength. (1991)
72. The universal receipient blood group is
(a) A (b) B (c) AB (d) O (1991)
73. Which is element that is abundant in seaweed is essential to prevent goitre ?
(a) Phosphorus. (b) Iodine
(c) Sodium (d) Common salt (1991)
74. 'Vitamin A' tablets are given to children
(a) to prevent blindness.
(b) to prevent beri-beri.
(c) to prevent scurvy.
(d) to promote tissue growth. (1991)
75. Milk is given to children for growth because it contains
(a) proteins (b) carbohydrates.
(c) vitamins (d) water. (1991)
76. Which is the following is responsible for controlling the temperature of the Human body ?
(a) body weight

- (b) the diet.
(c) the temperature of the environment.
(d) water content in the body. (1981)
77. The chances of heart attack are more in fat persons, whose diet contains excessive of
(a) vitamins (b) fats (c) sugar (d) protein (1981)
78. Diarrhoea and influenza are caused by
(a) different viruses.
(b) different bacteria.
(c) bacteria and viruses respectively.
(d) viruses and bacteria respectively. (1981)
79. Which cells are destroyed by excessive drinking of alcohol?
(a) heart cells. (b) liver cells.
(c) nerve cells. (d) lungs cells. (1981)
80. Sex of an embryo is determined by
(a) ova.
(b) fertilized egg.
(c) spermatozoon.
(d) ovum and spermatozoon together. (1981)
81. Conception is effective.
(a) during the menstrual period
(b) immediately after the menstrual period.
(c) two weeks after the menstrual period.
(d) just before the commencement of menstruation. (1981)
82. Twins are formed because
(a) of the defective structure of the uterus.
(b) two ova are simultaneously fertilized.
(c) the ovum splits into two identical parts before fertilization.
(d) of the abnormal formation of the foetus. (1981)
83. Identical twins are formed since
(a) the ovum, after fertilization, splits into two.
(b) a single ovum is fertilized by two sperms.

- (c) two ova are fertilized by a single sperm.
(d) two ova are fertilized by two sperms. (1981)
84. Why is gypsum added to soil ?
(a) To decrease salinity of the soil.
(b) To decrease the acidity of the soil.
(c) To decrease the alkalinity of the soil.
(d) To increase the sulphur content of the soil. (1981)
85. Loamy soil is suitable for growing rice
(a) because of clay in it.
(b) because it gets water-logged.
(c) because of its low percolation rate.
(d) because it is easy for transplantation. (1981)
86. Sonar is a HYV of
(a) jowar (b) rice (c) bajra (d) wheat (1981)
87. 'Rust' is a disease of
(a) wheat (b) rice (c) groundnut (d) cotton (1981)
88. In India tea is grown at higher altitudes whereas coffee is grown at lower altitudes. Why ?
(a) Tea requires heavier rainfall that is possible only at higher altitudes.
(b) Tea requires very cold climate that can be found only at higher altitudes.
(c) Tea plantation requires cheap labour that is available in plenty only at higher altitudes,
(d) Altitude has nothing to do with the growing of tea or coffee. (1981)
89. Solar absorption (solar energy per unit area) is maximum in the case of
(a) groundnut (b) maize (c) cotton (d) sugarcane (1981)
90. Short duration crops are especially suitable for
(a) hilly areas. (b) dry farming.
(c) sandy areas. (d) wet farming,

91. Which of the following has contributed the maximum for the high yield of foodgrains nowadays ?
(a) Increase in area under cultivation.
(b) New agronomic practices
(c) Double hybridisation of seeds.
(d) Mechanisation of farm operations. (1981)
92. In dry areas, field is well ploughed before rainfall
(a) so that the soil may not get hard.
(b) in order to remove weeds which have grown in the field.
(c) to raise short-duration crops.
(d) so that the soil may absorb maximum rain water. (1981)
93. Fruits infested with larvae of pests, imported from abroad, are more dangerous in India than in the country of their origin since
(a) they will eat away leaves till they find suitable type of food in India.
(b) they cannot be eliminated in India.
(c) natural predators who prey on them are not available in India.
(d) they are likely to transmit exotic diseases to the crops in India. (1981)
94. Which of the following is essential for calves to prevent rickets ?
(a) vitamin A (b) vitamin D and calcium
(c) vitamin E (d) vitamin K (1981)
95. How does afforestation help prevent soil erosion ?
(a) By preventing floods.
(b) By reducing the velocity of wind.
(c) Since the roots of trees hold the soil firmly.
(d) Since the roots of trees absorb the nutrients in the soil. (1981)
96. Which planet has recently been found to have rings around it, in the space photographs taken in the U.S.A. ?

- (a) Mars (b) Jupiter (c) Saturn (d) Uranus
(1981)

97. Planets are

- (a) luminous bodies that do not twinkle.
(b) non-luminous bodies that do not twinkle.
(c) luminous bodies that twinkle.
(d) non-luminous bodies that twinkle. (1981)

98. If light takes 1.8 seconds to reach the earth from the moon and 8 minutes to reach the earth from the sun, what is the time taken by light to reach the earth from the nearest star ?

- (a) 45 minutes (b) 4.5 days.
(c) 4.5 Years. (d) 45 years. (1981)

99. To an astronaut in space, the colour of the sky appears as

- (a) deep blue (b) orange-red (c) dark (d) white
(1981)

100. Which of the following statements is correct ?

- (a) Bhaskara and Aryabhata were launched from United States' cosmodromes.
(b) Rohini was launched from India.
(c) Rohini was launched from Soviet cosmodrome.
(d) Bhaskara was launched with French collaboration. (1981)

101. What is Hydrometer ?

- (a) An instrument to measure the water content in milk.
(b) An instrument to measure blood-pressure.
(c) An instrument to measure the humidity of air.
(d) An equipment to increase height of a person. (1982)

102. Kilo-Watt is a unit to measure

- (a) power (b) work (c) energy (d) current
(1982)

103. When a ship enters the sea from a river

- (a) it rises.
(b) it sinks.
(c) its depth in the water remains the same.
(d) it experiences sudden rotations.

114. Which of the following is the least inflammable fabric ?
(a) Cotton (b) Nylone
(c) Rayon (d) Silk (1982)
115. Which of the following contains carbon ?
(a) Chromite (b) Bauxite
(c) Lignite (d) Phosphorite (1982).
116. The retina of the eye corresponds to which part of the camera ?
(a) Lens (b) Film (c) Focus (d) Shutter (1982).
117. Which of the following blood groups is the universal donor ?
(a) A (b) B (c) AB (d) O (1982).
118. Which of the following fight infections in the body ?
(a) WBCs (b) RBCs
(c) Blood plasma (d) Haemoglobin (1982)
119. Which is the intestinal parasite that enters the body through the skin ?
(a) Tape worm (b) Hook worm
(c) Thread worm (d) Ring worm (1982)
120. Pearls are found in
(a) Turtles (b) Snails (c) Tortoises (d) Oysters (1982)
121. Honey bees are called social insects because
(a) they go from place to place to collect their food.
(b) they do not sting one another.
(c) they work for human welfare by helping pollination of plants. (1982)
122. What is Picoplankton ?
(a) A type of micro-organism.
(b) A kind of fish.
(c) A liberation organisation of Africa.
(d) An extinct animal species. (1982)
123. The best source of iron is
(a) Milk (b) Egg
(c) Cauliflower (d) Green vegetables (1982)

124. Vitamins are useful to the body for
(a) replacing the energy lost.
(b) the body growth-
(c) regulating the functions of the body.
(d) maintaing the body temperature. (1982)
125. Which of the following should be given to athletes for instant energy ?
(a) Carbohydrates (b) Protein
(c) Fat (d) Vitamin
126. In the case of heart-attack, the first-aid to be given is
(a) mouth-to-mouth respiration.
(b) spilling water on the face.
(c) Cardiac message.
(d) to take the patients to the doctor. (1982)
128. When floods occur on a large scale, you have a guard against the disease
(a) Typhoid (b) Small pox
(c) Cholera (d) Malaria (1982)
129. When one wishes to study the general health of a large population of children, the quick method is
(a) examining their diet and environment.
(b) examining their blood and uride.
(c) examining their hair, nail and skin.
(d) a through check-up of the body. (1982)
130. The fertiliser required soon after the sowing is
(a) green manure (b) Nitrate
(c) Potash (d) Phosphate (1982)
131. Contour bunding is useful
(a) in areas of hills with heavy rainfall.
(b) in dry land.
(c) river plains to avoid floods.
(d) deserts to prevent land storms. (1982)
132. Irrigation is essential in India because
(a) India has scanty rainfall.
(b) India has heavy rainfall.

(c) Water is required at specified intervals for most of the crops.

(d) The monsoons are quite irregular and seasonal.

(1982)

133. In the slopes of hills having 200 cm rainfall and 25° temperature, which crop can be cultivated best ?

(a) Coffee (b) Tea (c) Tobacco (d) Rubber

(1982)

134. Seeds are best preserved in

(a) dry and cool conditions

(b) dry and warm conditions

(c) wet and cool conditions

(d) wet and hot conditions

(1982)

135. Biogas plants in rural areas will help India by

(a) providing energy for all rural agricultural and industrial needs

(b) providing sanitation.

(c) solving unemployment problem.

(d) providing energy for domestic requirements. (1982)

136. Fat content of milk decreases during

(a) winter

(b) summer

(c) rainy season

(d) all seasons of the year.

(1982)

137. The difference in breeding between cows and buffaloes is :

(a) the gestation period for cows is less than the period for buffaloes.

(b) the gestation period for cows is more than the period for buffaloes.

(c) Buffaloes breed only in summer

(d) Cows breed only in summer.

(1982)

138. In poultry farming, the most commonly used grain is

(a) Barley (b) Jowar (c) Maize (d) Bajra

(1982)

139. Hydroponics is concerned with

(a) growing plants without soil

(b) growing plants without water but with atmospheric moisture.

- (c) treatment of water with sound.
 (c) conservation of water techniques. (1982)

140. "Flame of the forest" refers to

- (a) a lady with flame in her hands found in the forest.
 (b) forest full of trees which burst with red flowers during Autumn
 (c) the fire of the jungle which is always there in some jungles.
 (d) title of a book. (1982)

141. The constellations of stars appear at different positions in the sky at different times during night because

- (a) of the phenomenon known as 'optical illusion'.
 (b) earth revolves round the sun.
 (c) earth rotates about its axis.
 (d) celestial bodies are fast moving. (1982)

142. The astronauts travelling in space find the colour of the sky

- (a) black (b) white (b) blue (d) grey (1982)

143. The Ozone layer of the earth is useful for living things because

- (a) it serves as the source of oxygen by decomposing air.
 (b) it maintains the nitrogen cycle of the earth.
 (c) it maintains the temperature of the earth.
 (d) it protects them from excessive ultra-violet rays of the sun (1982)

144. Name the oddman out :

- (a) Betatron (b) Bevatron
 (c) Synchroton (d) Positron (1982)

145. 'Mulching' denotes

- (a) preventing damage to crops by acidity
 (b) spreading we straw and leaves in order to protect saplings
 (c) providing growth regulators to crops for better yield
 (d) grazing of cattle in the grass field

146. The age of a tree can be determined by

- (a) counting the number of rings on the stem
 (b) by scientific tests in the laboratory

- (c) by counting the number of leaves
- (d) by keeping a record of the seasons

147. Radio carbon Dating is useful to estimate the age of
(a) buildings (b) rocks
(c) soil (d) fossils

148. Amoeba type organisms belong to the category
(a) fungi (b) bacteria
(c) protozoa (d) virus

149. Which of the following is a HYV of rice ?
(a) I R-8 (b) UV-318
(c) Basmati (d) Sonalika

150. The ductless gland in the human body are
(a) kidney (b) exocrine gland
(c) endocrine gland (d) metabolic gland

151. The difference between explosion and combustion is
(a) explosion is a speedy process whereas combustion is slow
(b) there is rapid increase of pressure in a confined space in the case of explosion, which is not the case in combustion
(c) explosion emits heat whereas combustion emits light and heat
(d) combustion requires air whereas explosion can happen anywhere

152. Which of the following is the medicine of Typhoid ?
(a) B.C.G. (b) Chloromycetin
(c) Vitamin A (d) Penicillin

153. What do you know about U. F. O. s ?
(a) they are flying saucers
(b) sophisticated aircrafts from other planets
(c) light phenomenon in the sky
(d) nothing is known for certain about them

154. Body growth depends on
(a) Pituitary glands (b) Proteins
(c) Endocrine glands (d) Liver

155. Semen of a bull is preserved in
(a) ice (b) tin box
(c) liquid carbon dioxide
(d) liquid nitrogen

156. Foot and mouth diseases occurs in
(a) cattle, sheep and pigs
(b) cattle and sheep only
(c) birds and animals
(d) cattle only
157. When a person enters a dark room from light, he is not able to see clearly for sometime. Later he gradually begins to see things. This is because
(a) eye becomes familiar with darkness in course of time
(b) retina becomes bigger
(c) the iris expands
(d) the iris contracts
158. When a radio station is opened in a remote rural area without electricity, Which of the following options is the best ?
(a) laying special transmission line for the radio station
(b) installing a diesel generating set
(c) setting up solar cells
(d) transmission with electricity
159. Introduction of a steel plough in the place of a wooden plough is an instance of
(a) advanced technology
(b) appropriate technology
(c) retundent technology
(d) obsolete technology
160. For appropriate technology what factors are of immediate concern ?
I. Skilled manpower II, capital III. infrastructure
IV. latest innovations
(a) I and II (b) IV and III (c) I and IV
(d) II and IV
161. Flourescent tube has
(a) argon (b) sodium vapour and argon
(c) mercury vapour and argon
(d) neon and bromine
162. Assertion (I) : Iron is galvanized to prevent rusting.
Reason (II) : Zinc has better oxidation capacity.

- (a) I and II are correct, and II is the proper explanation for I
- (b) I and II are correct, II is not the proper explanation for I
- (c) I is correct, II is wrong
- (d) I is wrong II is correct

163. March number denotes speed of

- (a) car
- (b) ship
- (c) aeroplane
- (d) horse

164. The simplest form of the ore of aluminium is

- (a) bauxite
- (b) ilmenite
- (c) pyrite
- (d) gypsum

165. Arrange the following fertilizers in the order of decreasing nitrogen content : I. Urea II. Ammonium sulphate III. Ammonium nitrate IV, Ammonium phosphate

- (a) II, I, IV, III
- (b) III, I, II, IV
- (c) IV, II, I, III
- (d) I, II, IV, III

166. Arrange the following forms of iron according to the descending order of carbon content and other impurities they possess.

I. wrought iron II. pig iron III. cast iron

- (a) I, II, III
- (b) II, III, I
- (b) III, II, I
- (d) I, III, II

167. Turmeric, used in spices etc. is

- (a) a flower
- (b) a root
- (c) a stem
- (d) a leaf

168. Nowadays in an oxygen tube, another gas is mixed to reduce the strong effect of pure oxygen Which is the gas ?

- (a) Helium
- (b) Nitrogen
- (c) Carbon dioxide
- (d) Oxygen

169. Earthquakei occur owing to

- (a) changes in earth crust
- (b) movements in the interior layers of the earth
- (c) volcanic eruptions
- (d) none of the above

ANSWERS

1. Ans. (d).
2. Ans. (b).
3. Ans. (d). The proper explanation in this case is that the polar radius is slightly less than the equatorial radius.
4. Ans. (c) A steel bar can be made to float on a light liquid like water only if it is hallow.
5. Ans. (d). The ball may be hallow or solid but if it is made of a highly elastic material, it will bounce.
6. Ans. (a).
7. Ans. (b).
8. Ans. (b). Please note that responses (a) and (d) refer to the same position.
9. Ans. (c).
10. Ans. (a).
11. Ans. (a).
12. Ans. (b). The heat energy that is there already in the sun will be fast depleted if it was not recoup by the energy produced through nuclear fusion.
13. Ans. (d) The iron sheets may be either covered by a zinc sheet or a coating of zinc may be given to it.
14. Ans. (b). Note that rubber and silk do not have cellulose.
15. Ans. (b).
16. Ans. (d). Although bacteria and fungi are also consumers for the purposes of nutrition, their main function is decomposition of dead material.
17. Ans. (a).
18. Ans. (c).
19. Ans. (b). BCG (Becillus Calmette (Guerine) as a Tuberculosis medicine.
20. Ans. (a). The sun traverses its annual motion only between the Tropic of Cancer and Tropic Capricorn. So the sun never goes vertically over any place in the temperate

zone of the earth. Only when the sun is vertically overhead, at a place we see that the sun is at the zenith point.

21. Ans. (a).
22. Ans. (b).
23. Ans. (a). Shifting cultivation in North-west India is called locally Jhum.
24. Ans. (b). Wheat may also be cultivated in alluvial soil but generally require less than 150 cm. rainfall.
25. Ans. (d). All eguminious crops help in nitrogen fixation. All pulses including beans are legumes.
26. Ans. (d). Compost is manure whereas others are fertilizers. None of them is a complete fertilizer (NPK).
27. Ans. (b).
28. Ans. (a).
29. Ans. (c).
30. Ans. (d).
31. Ans. (a)
32. Ans. (b). The copper age was followed by bronze age which was finally followed by iron age.
33. Ans. (b).
34. Ans. (a). Although carbon monoxide, sulphur dioxide are atmospheric pollutant in terms of volume. Smoke occupies the first place.
35. Ans. (a). Perspiration passes only loss of water through evaporation. Salts and carbohydrate do not evaporate.
36. Ans. (c). The formation of images through a hole can not be explained only on the basis of rectilinear propagation of light. Other light phenomenon also are responsible for this.
37. Ans. (a). As depth increases, the salinity of water also increases. As salinity increases density decreases.
38. Ans. (b). Only when wood burns partially carbon monoxide may be found.
39. Ans. (a). In the case of hydrogen there is only a proton in the nucleus. Neutron in the nucleus account for the difference between atomic number and atomic weight.

40. Ans. (a). The simple formula for water is H_2O .
41. Ans. (a). Supersonic jets fly in the troposphere, at the end of which the mesosphere containing ozone layers is situated. Supersonic jets motion affects ozone. A jet in the troposphere does not cause sound pollution but may affect the ground area through which passes.
42. Ans. (a). The surface of ice is smooth compared to a concrete surface. The rough surface is more conducive for walking than a surface. Because the former allows more grip.
43. Ans. (b).
44. Ans. (a). Human breathing results in decrease of oxygen and increase of carbon dioxide in the atmosphere.
45. Ans. (d). During night a tree breathes performs respiration by taking in oxygen and releasing carbon dioxide.
46. Ans. (a).
47. Ans. (c). Birds other than bats cannot easily fly in the dark. Since they are not capable of producing ultrasonic waves.
48. Ans. (a). Pulses are good sources of protein. But in the responses given, milk is indicated as the main source of protein. The other responses will have to be ruled out because of a wrong association of items.
49. Ans. (a).
50. Ans. (a). The primary cause of increase in incidence of malaria is the increase in the mosquito population. The reasons for increase in mosquitoes are given in response (d). Therefore response (d) is only the secondary cause.
51. Ans. (a).
52. Ans. (a).
53. Ans. (b).
54. Ans. (d). A child has to be immunised against tuberculosis also. But it is not included in the triple.
55. Ans. (c). Normally it is desirable to use only a few gadgets from a single outlet. However, if one gadget fails it may not affect the other gadgets.
56. Ans. (a).

57. Ans. (b). In reality water freezes from the top to bottom.
58. Ans. (c).
59. Ans. (b).
60. Ans. (d).
61. Ans. (d).
62. Ans. (c). The release of carbon dioxide by yeast results in the over all increase in volume of the bread. Carbon dioxide remains in the hallow spaces within the bread.
63. Ans. (b). Relative humidity that is the mixed water evaporate content in air increases with decrease in temperature.
64. Ans. (a).
65. Ans. (d).
66. Ans. (a).
67. Ans. (c). For copper reading of the temperature of boiling liquid, the thermometer should be inserted well into the liquid, but without touching the bottom or the sides.
68. Ans. (a).
69. Ans. (c). It is worth nothing that water is struck at shallow depth compared to gas and oil.
70. Ans. (b).
71. Ans. (c).
72. Ans. (c).
73. Ans. (b). Iodine is an element that is found abandoned in seaweed. Traces of Iodine are essential for preventing in goitre.
74. Ans. (a).
75. Ans. (a). Milk contains carbon hydrates and proteins along with water. Milk is primarily the source of energy for children. But since the question refers to growth, response (a) has to be chosen as the correct answer.
76. Ans. (d).
77. Ans. (b).
78. Ans. (c).
79. Ans. (b). Although excessive alcohol affects the heart and nerves also, The primary effect is on liver cells.
80. Ans. (c).
81. Ans. (c).

82. Ans. (b).
83. Ans. (a).
84. Ans. (b). Since gypsum is a salt, it will undergo reaction with acid in the soil thereby reducing the acidity of the soil.
85. Ans. (c). The low percolation effect rate of a loamy soil enables retention of water and moisture which is essential for the growth of rice.
86. Ans. (d).
87. Ans. (a).
88. Ans. (a).
89. Ans. (a).
90. Ans. (b). Short duration crops are required mainly when retention of moisture is a problem. Such a problem is acute in the case of dry farming.
91. Ans. (c). The contribution of mechanisation of farm operations to increase the production is not much since mechanisation is not wide-spread. The increase in area under cultivation is also marginal. New agronomic practices have certainly contributed for better productivity, but their contribution would be less than that of hybrid varieties of food grains.
92. Ans. (d).
93. Ans. (c). Although the larvae are likely to transmit exotic diseases, the real problem is the absence of the natural predators who will prey on them. When natural predators, it may be difficult to deal with these exotic disease since medicines may not be available.
94. Ans. (b). Calcium is as important as vitamin D for avoiding Rickets.
95. Ans. (b).
96. Ans. (d).
97. Ans. (b).
98. Ans. (c). The nearest star to the solar system is situated on a distance of 4.5 light years.
99. Ans. (c).
100. Ans. (b).

101. Ans. (c). Response (a) refers to lactometer ; (b) refers to sphygmo-manometer.
102. Ans. (a).
103. Ans. (a). This is because the sea water is dense compared to river water and hence a lesser volume of water has to be displaced now.
104. Ans. (d).
105. Ans. (d).
106. Ans. (b).
107. Ans. (c).
108. Ans. (b).
109. Ans. (d). Response (a) corresponds to treating rubber with sulphur.
110. Ans. (c).
111. Ans. (b).
112. Ans. (c).
113. Ans. (d).
114. Ans. (d). None of the given materials is really fire-resistant.
115. Ans. (c).
116. Ans. (b). The pupil of the eye corresponds to lens and the eyelids corresponds to shutters of the camera.
117. Ans. (d).
118. Ans. (a).
119. Ans. (b).
120. Ans. (d). Some Oysters produce pearl.
121. Ans. (d). Bees and ants are social animals.
122. Ans. (a).
123. Ans. (d). Important sources of iron are green vegetables, liver, meat, egg, yolk, raisins, fish, etc.
124. Ans. (c).
125. Ans. (a).
126. Ans. (c). To take the patient to doctor's house for first aid.
127. Ans. (a).
128. Ans. (c). Other diseases may also spread but Cholera and Plague are the most dangerous against on a mass scale.

129. Ans. (c). Note that a thorough check-up is not a quick method.
130. Ans. (b) Soon after sowing nitrogenous fertilisers are to be used. Note that green manure is not a chemical fertiliser.
131. Ans. (a).
132. Ans. (d). The average rainfall in India is adequate, neither scanty nor heavy.
133. Ans. (b). coffee requires less rain and cool climate.
134. Ans. (a).
135. Ans. (d). Biogas will be sufficient only for domestic use and cannot be used for agriculture and industry.
136. Ans. (b).
137. Ans. (a).
138. Ans. (c).
139. Ans. (a). The nutrients necessary for the plant are supplied in glass.
140. Ans. (b).
141. Ans. (c).
142. Ans. (a). Actually there is no light and so the sky appears dark (which, in the Question, is given as black).
143. Ans. (d).
144. Ans. (d). All others are different types of cyclotrons.
145. Ans. (b). This is a practice adopted to give protection to young plants in the most economic way. The plants are protected from stray cattle and other animals which may eat them away.
146. Ans. (a).
147. Ans. (d).
148. Ans. (c).
149. Ans. (a). There are other high yielding varieties of rice but the other responses do not contain them.
150. Ans. (c). It is to be noted that means ductless. There is no such thing as metapolic gland.
151. Ans. (b).
152. Ans. (b).

153. Ans. (d). U.F.O. means unidentified Flying object. Such objects have been referred to as Flying Saucers. However there is not disiniteness about existence. of such object. So we cannot conclude that they are really flying saucers.
154. Ans. (b). The Endocrine glands including pituitary glands may contribute to body growth by releasing the appropriate hormone. The basic function of build up the body is done by proteins.
155. Ans. (d). It is worth noting that nitrogen is a non-reactive medium.
156. Ans. (a). This disease occurs in alcloven-footed animals.
157. Ans. (c). As a person remains in bright light only by contracting the iris we can avoid getting too much light into his eye. When he enters the dark room, he has to gardually expand the iris so that he may begin to see. These phenomenon is known as Accommodation.
158. Ans. (c). Although it is possible to run a radio station with a diesel generating set, it will prove costly. Therefore setting up solar cells will be a energy-saving device.
159. Ans. (a). Although a steel plough may not be a matter of technological complexity, relatively it should be considered advanced technology compared to the wooden plough. It is worth noting that the term appropriate technology cannot be applied in the context of comparison between a wooden plough and a steel plough only. Although there is no such term as obsolete technology, the use of wooden plough in an advanced area like Punjab may be considered as in instance of it. Reduntant technology envisages use of equipments and implements not required by the type of production that is ignited.
160. Ans. (a). Choose the appropriate technology the factors skilled manpower, capital and infrastructure can certainly be taken into account. However capital and skilled manpower are more important than the other two factors are given in the question.

- 161. Ans. (c).
- 162. Ans. (a).
- 163. Ans. (c).
- 164. Ans. (a).
- 165. Ans. (d).
- 166. Ans. (d).
- 167. Ans. (c).
- 168. Ans. (a). Since helium is a inert gas. It does not affect breathing while the mixture reduces pressure of the oxygen gas.
- 169. Ans. (b).

Agriculture

WEATHER

Weather is an important determinant of agricultural production. The most important weather factor connected with agriculture is rainfall. In India rainfall is mainly dependent on south-west monsoon. The monsoon depressions and the breaks in the monsoon determine the amount of rainfall. Thunderstorm, hail, cyclonic storm and western disturbances also have an impact on the amount of rainfall in different places. Annual variation in rainfall results in drought and flood. Evapo-transpiration is the total effect of evaporation from the soil surfaces and transpiration by the plants. Water balance may be affected by changes in evapo-transpiration. Temperature is another decisive factor in plant growth. The generally high temperature prevailing in India is suitable for growth of different plants. Cold waves and frosts may affect growth on many plants in North India. Availability of sunshine is not a problem in India, since almost every place gets enough sunshine. High speed wind may affect agricultural production in a variety of ways. Wind breaks, planted across the fields in the direction of prevailing winds, afford protection to plants against damage caused by winds. They also help to reduce evapo-transpiration loss, soil erosion etc.

SOILS

Soil is the thin layer of earth's crust which acts as a natural medium for the growth of plants. Soils differs from parent material in morphological, physical, chemical and biological properties. Soil composition and texture varies from place to place. The chemical composition of rocks consists of different oxides in varying proportions. Various soil particles such as gravel, coarse sand, medium sand, fine sand, silt and clay also

determine the properties of soil such as water retention capacity, permeability, aeration, plasticity and nutrients supply ability. Different textures of the soil are : clay, sandy clay, silty clay, clay loam, sandy clay loam, silty clay loam, loam, sandy loam, silt loam, sand, loamy sand and silt. The principal minerals occurring in the earth's crust are : Feldspar (48%), Quartz (36%), Mica (10%) and others. The organic matter found in the soil is described as Humus and consists of plant remains, residues of micro-organisms and the products of their decomposition. Humus consists of carbon (50%), Oxygen (35%), nitrogen (5%) and hydrogen (5%). Different kinds of micro-organisms living on the soil are microfauna such as protozoa and nematodes and macroflora such as bacteria, actinomycetes, fungi and algae. The activity of these macro-organisms is essential for conversion of the green organic matter into humus.

The main soil types are alluvial, black, red, laterite and desert. Soils face problem because of erosion acidity, salinity and alkalinity. Erosion results in shallow soil and deep gullies which cannot be cultivated properly. Acidic soil which occurs in different parts of India is not good for plant growth. Soil containing less than 5.5 pH are considered acidic. Acidic soil may be treated with lime. In many arid and semiarid regions of India, saline and alkali soils are found. Saline soil is mainly the result of formation of salts during weathering. Since there is not much water, the salts are not leached. Alkali soil may be reclaimed by application of gypsum.

FERTILIZERS AND MANURE

Plants require sixteen essential food elements. Of these nine are macro-nutrients required in large quantities. They are carbon, hydrogen, oxygen, nitrogen, phosphorus, potassium, sulphur, calcium, magnesium. The micro-nutrients required only in traces are : iron, manganese, copper, zinc, boron, molybdenum and chlorine. Carbon is obtained from carbon dioxide in the air ; oxygen is got from air and water. Hydrogen is available from water. Nitrogen is got from air and soil. All other nutrients have to come from the soil. Nitrogen phosphorus and potassium are called primary plant nutrients. Calcium, magnesium and sulphur are called secondary

nutrients. Each element contributes to the proper growth of the plants in specific ways. Micro-nutrients are as important as macro-nutrients for the proper growth of the plant.

Since agricultural crops remove from the soil substantial quantities of the elements such as nitrogen, phosphoric acid and potash, these nutrients will have to be artificially supplied to the soil. Beside erosions and leaching also lead to heavy losses of these nutrients. Indian soils are usually very poor in organic matters and in nitrogen. Phosphate deficiency is less widespread and potash deficiency occurs only in small pockets. The depletion of soil fertility requires the application of manures and fertilizers so as to maintain the fertility of the soil.

Manures : Manures of all types are required for proper plant growth. Farmyard manure, composted manure, town compost, sewage and sludge, night soil, green manure, concentrated organic manure and bulky organic manure are all applied to the soil depending on the availability and utility.

Farmyard manure : is a mixture of cattle dung, remnants of straw and plant stalks. However, the method of preparation is very important for full utilization of the material. The contents of nitrogen (N), phosphoric acid (P_2O_5) and potash (K_2O) in the Indian farmyard manure is much less than 50% of what is found in the European farmyard manure. Adequate moisture should be maintained for the decomposition of organic matter in the manure pit. Since farmyard manure is deficient in phosphoric acid, it is advisable to add some superphosphate.

Composted manure is manure prepared through the process of composting i.e. reducing vegetable and animal refuse to a quickly utilizable condition for improving soil fertility. Kitchen wastes materials such as cereals straw, cotton waste, cow dung, husk, farm weeds and grasses, leaves, horse manure, urine-soaked earth etc. are fed into the manure pit and left for about four months for composting. The manure obtained by composting are aerobic and anaerobic. Composting is done better during rainy seasons. Use of manure in the field by composting may sometimes cause a loss of some of the mineral nutrients by stimulating the growth of micro-organisms.

Town compost is prepared by depositing night soil, town refuse etc. in pits for about three months. Sewage should not be used directly in farms, since bacterial contamination will pose health hazard to people through the vegetables grown on untreated sewage or sullage. The latter should be treated in a settling or septic tank where they undergo preliminary fermentation. The 'activated sludge' is a good plant nutrient and even the effluent from the sewage tank contains nitrates in solution and can be used for manuring and irrigating crops. India's 'sewage farms' have been established in the peripheries of large towns in order to make use of the sewage and sullage of the towns. *Night soil* mixed with soil, ash, charcoal or sawdust undergoes dehydration and is fit to be used as manure.

Green manure supplements farmyard and compost manures. For this purpose green manure crops are raised and ploughed into the soil. The green manure also protects the soil against erosion and leaching. The most outstanding green manure crop is sunhemp followed by clusterbean, cowpea, horse gram etc. Inter-cropping and other agronomic practices are resorted to in order to get green manure for the fields. If a leguminous crop is supplied superphosphate manure, its fertilising value can be enhanced very much, thereby converting an inorganic fertilizer into an organic manure.

Fertilizers : The three main fertilizers are nitrogenous, phosphatic and potassic. *Nitrogenous* fertilizers are used in nitrate, ammonia, ammonium salts, e.g. nitrate of soda (15%), ammonium sulphate (20%), ammonium nitrate (17%), ammonium chloride (25%), urea (45%) and calcium ammonia nitrate (28%). Ammonium sulphate is the most widely used fertilizer in the country. However it has an acid effect so that its continued use may produce soil acidity. Sodium nitrate is useful for acidic soils. 'Nitro Chalk' is a mixture of ammonia nitrate (33%) with limestone or dolomite. This is particularly useful for acid soils. Urea is a highly concentrated nitrogenous fertilizer. Ammonium is a gas containing 80% nitrogen and may be used as a liquid or a gas in water. Organic nitrogenous fertilizers are oilcakes, fish manure and dried blood.

Phosphate fertilizers are mainly superphosphate (16%), triple superphosphate (48%), bone-meal (20%) and rock phosphate (25%). Superphosphate is widely used as phosphatic fertilizer in India. Rock phosphate is imported from countries which have them as natural rock deposits. Bone-meal is an age-old phosphatic manure. However, it should not be used as a top dressing but should be incorporated into the soil. It is particularly suitable for acid soils and it is a safe manure for all crops. The 'basic slag', a by-product of steel factories is a good phosphatic fertilizer and is alkaline so that it is useful for acid soils.

Key

The main potassic fertilizers are ~~maria potash~~ (55%) (potassium chloride) and ~~potassium sulphate~~ (50%). Wood ash, cattle dung ash, tobacco stems and water hyacinth are indigenously available sources of ~~potash~~ potassic fertilizers are required only in well-known deficiency areas and in soils and for certain crops such as tobacco, potato, onion, tomato and fruit trees.

Compound fertilizers are fertilizers supplying two or three nutrients simultaneously, e.g., potassium nitrate, diammonium phosphate, NPK fertilizers. ~~Mixed fertilizers~~ are fertilizer mixtures. Mixing of fertilizer is desirable for local applications. However while mixing fertilizers, incompatible combinations should be avoided. Mixtures containing all the three principal nutrients such as NPK fertilizers are called complete fertilizers. Such preparations applicable for different crops are available in the market in ready-made form.

Applications of fertilizers ~~and manures~~. Chemical manures should be applied much before sowing. However they may be applied only after the seedling has established themselves. Inorganic fertilizers may be applied as top dressing or at the time of transplanting. Nitrogenous fertilizers may be applied as top dressing and in split applications. For maximum fertilizer absorption, the crop should be irrigated immediately after its application in order to ~~soak~~ ~~the~~ ~~nutrients~~ ~~into~~ ~~the~~ ~~soil~~. ~~It is~~ ~~because of this that chemical fertilizers are generally applied only to irrigated lands.~~

CROPPING PATTERNS & PRACTICES

Crop Seasons : Normally two crop seasons in India are well recognised. ~~Kharif is the monsoon~~ season from July to October. Rabi is the period from October to March. Sometimes a third crop is grown in the period March to June. It is known as summer season or zaid. In different parts of the country the crop seasons overlap and the classification differs.

Mixed Cropping : When more than one crop is raised simultaneously.

Rotational Cropping : When different crops are raised in field in sequence with a year, the practice is called rotational cropping.

Double Cropping : When two crops are raised in a year in sequence.

Multiple Cropping : When more than two crops are raised in sequence in a year,

Relay Cropping : When one crop is already standing on the field, another crop is sown. This practice is called relay cropping

PLANT DISEASES

Crop	Name of Disease	Causative Organism	Borne by
Rice	Brown leaf spot	Fungi	Seed
Rice	Bacterial blight	Bacteria	Seed
Cotton	Black arm	Bacteria	Seed
Sugarcane	Red rot	Fungi	Seed
Bajra	Green ear	Fungi	Soil
Bajra	Smut	Fungi	Soil
Groundnut	Tikka	Fungi	Soil
Tomato	Root knot	Nematode	Soil
Rice	Blast	Fungi	Air
Wheat	Rust	Fungi	Air
Coffee	Rust	Fungi	Air
Potato	Mosaic	Virus	Plant-part
Mango	Malformation	Mite	Plant-part
Cauliflower	Whiptail	Deficiency of Molybdenum	...
Apple	Scab
Rice	Khaira	Deficiency of zinc	...
Bajra	Ergot	Fungi	...
Tea	Bacterial blight	Virus	Plant-part
Banana	Bunchy top	Virus	Plant-part

PLANT PESTS

Classification of Plant Pests :

Pests are generally classified as follows :

(i) Arthropods (Jointfooted invertebrates) :—

(a) Insects like grasshopper, caterpillar, gundhy, bug, fly, beetle, cotton bollworm, mites khapra beetle, rice weevil, red grain beetle, lesser grain borer pulse beetle, angoumois grain moth, etc.

(b) Non-insect arthropod like crab.

(ii) Molluscs :— snail, slug

(iii) Mammals :— rodent, monkey, wild elephant, etc,

(iv) Birds :— pigeon, parrot, sparrow, crow.

Some Important Plant Pests :

(i) Stem Borer of Rice

(ii) Rice Grasshopper or Brown plant Hopper of Rice

(iii) Gundhy Bug or Paddy Bug

(iv) Spotted Bollworm of Cotton

(v) Pink Bollworm of cotton

(vi) Coconut Caterpillar

(vii) Tobacco Caterpillar

Storage Pests of Rice and Pulses :

(i) Khapra Beetle

(ii) Rice Weevil

(iii) Red Grain Beetle

(iv) Lesser Grain Borer

(v) Rice Moth

(vi) Angoumois Grain Moth

(vii) Pulse Beetle

important crops in India

Name of the crop.	Species	Important growing areas	Physical condition	Important varieties	Details of cultivation	Remarks
Rice	Genus Gryza . 18 wild species. The only cultivated species in India 'Asian-rice'; subspecies 'Indica.	West Bengal Andhra Pradesh, Tamil Nadu, Bihar.	High temperature below 35°C. Tropical, and temperate areas. Water-logged conditions. Different types of soil including riverine alluvium, red loamy, coastal alluvium, and laterite.	Tellahamsa Ratna, Rajendra, IR-8, Jaya, Prabhat, IR-20, Pankaj, Sonal, Basmati, Kalinga, Cauvery,	Short duration variation varieties of 90 days. Long duration varieties of 240 days. Transplantation of paddy 20 to 40 days after sowing. Broadcasting in unirrigated rainfed areas.	India the second leading producer of rice in the world. The first major cereal crop in India.
Wheat	The common bread wheat (85% production) Macaroni Wheat (14%)	Punjab, Haryana, Uttar Pradesh, Rajasthan	Temperate climate Well drained loam. Ideal 70 cm rainfall. Frost-free winter.	Kalyan sona, the most important medium variety. Sonalike the most important short-duration variety. Others Sonara, Shera, Janak.	Sowing done in November for medium and long duration varieties. Sown by drilling or broadcasting. 4 to 6 irrigations optimum.	The first food crop in the world. In India the second important food crop.

<i>Name of the crop.</i>	<i>Species</i>	<i>Important growing areas</i>	<i>Physical condition</i>	<i>Important varieties</i>	<i>Details of cultivation</i>	<i>Remarks</i>
Maize	—	Uttar Pradesh, Bihar, Madhya Pradesh, Rajasthan, Punjab.	Fertile deep and well-drained soil Warm weather.	—	Period of maturity 90 days (short duration crop)	Main used in animal feed, pyrticularly poultry and in starch industry
Sorghum	—	Maharashtra, Karnataka, of other States.	Grown in Kharif and Rabi seasons. Rainfall 40 to 100 cm. Black soil ideal.	Traditional varieties. Improved varieties. CSH-1 to CSH-8. High yielding varieties CSV-1 to CSV-7. Special fodder (forage varieties)	Cultivated mainly as a fodder crop.	—
Millets	—	Karnatak Madhya Pradesh, Andhra Pradesh, Tamil Nadu	Dry areas. Red or laterite soil. Withstands adverse weather conditions.	—	—	—

<i>Name of the crop.</i>	<i>Species</i>	<i>Important growing areas</i>	<i>Physical condition</i>	<i>Important varieties</i>	<i>Details of cultivation</i>	<i>Remarks</i>
Pulses	No hybrid or improved or high-yield variety have been	Madhya Pradesh, Uttar Pradesh, Punjab, Rajasthan, Dry areas of other States.	Generally dry areas. Moderate rainfall. Black soil. Most of them dry crops.	—	Cultivated as intercrop and in rotation, since they are leguminous.	—
Tea	—	Assam, West Bengal, Kerala, Karnataka and Tamil Nadu.	Moist and warm climate. Rainfall 125 to 750 cm. Well drained deep loam or forest land. Acidic soil rich in iron and low in calcium ideal.	—	System of shading the tea plants. Tea grows into small or medium-sized trees. Two leaves and a bud is pulked. The economic life of the tea tree 50 years.	The most important beverage in the world.
Coffee	Two species are cultivated in India.	Karnataka, Tamil Nadu, Kerala and Andhra Pradesh	Rainfall from 100 cm to 250 cm. Hill tract with gentle slope. Temperature between 15°C and 25°C.	—	Shade is provided. Excessive wetness and water-logging should be avoided.	Coffee is the powder of the berries (nuts) of the tree.

<i>Name of the crop.</i>	<i>Species</i>	<i>Important growing areas</i>	<i>Physical condition</i>	<i>Important varieties</i>	<i>Details of cultivation</i>	<i>Remarks</i>
Rubber	A large number species give latex from which natural rubber is formed.	Introduced from Brazil. Kerla, Tamil Nadu and Karnataka.	Generally cultivated at elevations of 500 to 1500 metres. Red and laterite soils ideal. Fairly distributed rainfall of 200 cm. Warm humid weather upto 35 C. well-drained deep loamy soil.	—	Perennial crop and can be plucked throughout the year. The trees grow upto 30 metres. When girth is around 55 cm tapping of latex starts. Latex is tapped from the bark by making a wound and allowing latex to flow. The tree has economic life of	—
Coconut	—	Kerala, coastal areas.	All types of well-drained tropical soil. Mean temperature 27 C. Bright sunshine. Rainfall 100 to 225 cm. desirable.	—	Transplanting is done. Economic life 50 to 60 years Yields coconuts every month. Maturation period of a nut one year.	All coconut product are put to use, Cobra, fibre fresh water, tender coconut coir etc.

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PART IV
GEOGRAPHY

GEOGRAPHY

Geography is an important part of general knowledge. In the elementary type of competitive examinations, the emphasis is on names of places and location of industries and projects. But it is good to remember that geography is a branch of knowledge and discipline which has got a very systematic treatment. The physical social and economic geography of India and of the world should be certainly vast and difficult matter for a general candidate. So in the Geographical Terminology, we have presented, in a sort of systematic fashion, geography matters on which normally question are put. Since there is no escape from knowing and learning names of places and their locations, these are also attended to in the subsequent chapters. While any amount of additional information is easily available in the government records and miscellaneous sources, we hope that candidates will be able to remember the information presented in this Part and will be able to answer the questions in the examination satisfactorily.

Geographic Terminology

Terrestrial Astronomy.

1. Earth : The shape is that of an oblate spheroid (Geoid). Equatorial radius 6378 km. surface area 196 million Sq. miles. Land and water are in the ratio 3 : 7 Mean density 5.5 gm/C.C.
2. Pole Star : is a fixed star, towards which the north pole of the earth's axis is always pointing. The altitude of the pole star at a place in the northern hemisphere gives the latitude of the place.
3. Antipode : Two places situated at the extremities of any diameter of the earth.
4. Latitude : of a place on the earth is the angular distance of the place from the equator. India lies between 8°N and 37°N .
5. Parallels of latitude : Circles drawn on the globe parallel to the equator. All the places on a parallel latitude of will have the same latitude :
6. Important parallels of latitude :
 - i) Tropic of Cancer ($23\frac{1}{2}^{\circ}\text{N}$) (2) Tropic of Capricorn ($23\frac{1}{2}^{\circ}\text{S}$) (3) Arctic Circle ($66\frac{1}{2}^{\circ}\text{N}$) (4) Antarctic Circle ($66\frac{1}{2}^{\circ}\text{S}$)
7. The zones of the Earth
 - (1) Torrid Zone (Tropical) ($23\frac{1}{2}^{\circ}\text{N}$ to $23\frac{1}{2}^{\circ}\text{S}$)
 - (2) North Temperate ($23\frac{1}{2}^{\circ}\text{N}$ to $66\frac{1}{2}^{\circ}\text{N}$)
 - (3) South Temperate ($23\frac{1}{2}^{\circ}\text{S}$ to $66\frac{1}{2}^{\circ}\text{S}$)
 - (4) North Frigid (Arctic Circle ($66\frac{1}{2}^{\circ}\text{N}$ to 90°N)
 - (5) South Frigid Antarctic Circle) ($66\frac{1}{2}^{\circ}\text{S}$ to 90°S)
8. Meridian through a place : on the surface of the earth is the great circle on the globe passing through that place and the north and the South Poles.

9. Meridians of Longitude : are great circles on the globe passing through the North and the South Poles.
10. Longitude of a place : is the angular distance between the meridian through that place and the Prime Meridian. India lies between 68° E and 97° E.
11. Meridian at a place : is a great circle on the celestial sphere of that place passing through the North and the South directions of that place and the zenith of that place.
12. The consequences of the rotation of the earth about its axis from west to East : (1) Day and Night, occur (2) All heavenly bodies appear to be moving from east to west.
13. Ecliptic : The apparent path of the sun throughout the year, as a result of the motion of the earth round it. This will be a great circle on the celestial sphere of any place. The plane of the ecliptic is the same as the plane of the earth's orbit.
14. Consequences of the inclination of the axis of the Earth to the plane of the ecliptic at $66\frac{1}{2}$
 - (i) The durations of the day time and the night time at any place except on the equator keep changing throughout the year
 - (ii) The occurrence of the seasons.
15. Equinoxes : March 21st is known as vernal or spring equinox and September 22 as autumnal equinox. On these two days the sun is vertically overhead at the noon. The sun will rise exactly in the East and set exactly in the west all places on these days. The day and the night will be of equal duration at all place.
16. Solstices : June 21st is known as Summer Solstice and December 22nd as winter solstice in the Northern hemisphere. Summer solstice marks the beginning of the summer season. The duration of day time on that day will be the maximum for any place in the northern hemisphere. The sun will be vertically over the Tropic of cancer. Similar events on winter solstice.

17. **Midnight Sun** : A phenomenon of high latitudes observed at and around mid-summer, when the sun does not sink below the horizon throughout the 24 hours and therefore may be seen at midnight. This is the direct consequence of the inclination of the axis of the earth to the plane of the orbit.
18. **Perihelion** : The position of the earth or of any other planet in its orbit when it is at its nearest Point to the sun.
19. **Aphelion** : The position of the earth or of any other planet in its orbit when it is at its greatest distance from the sun.
20. **Perigee** : The point in the orbit of the moon or of a planet or in the apparent orbit of the sun, when it is at minimum distance from the earth.
21. **Apogee** : Similar point at maximum distance.
22. **Greenwich Mean Time** : Local time at Greenwich.
23. **Standard Time** : A particular meridian of longitude passing through a country is chosen as the reference meridian. The local time along this meridian calculated with respect to Greenwich Mean Time in terms of its longitude is taken as the standard Time for that country.
24. **Indian Standard Time** : Time along $82\frac{1}{2}^{\circ}$ E Meridian of longitude, calculated with respect to G.M.T. ($5\frac{1}{2}$ hours).
25. **International Date Line** : An imaginary line of the globe, approximately along the 180° meridian of longitude. when a person crosses this line from East to West, he gains one day and when he crosses from West to East, he loses one day.
26. **Solar Day** : It is the time interval between successive crossings of the sun across the meridian of the celestial sphere of any fixed place in the same direction. This is equal to 24 hours.
27. **Sidereal Day** : The period of rotation of the earth about its axis. This is calculated with respect to any fixed star. It is four minutes less than 24 hours.

28. **Solar Year (Tropical Year) :** It is the average interval between successive returns of the sun in its apparent motion along the ecliptic to a fixed position to the celestial sphere of any fixed place. This is equal to 365.24 mean solar days.
29. **Sidereal Year :** The period of revolution of the earth around the sun. It is calculated with reference to any fixed star. It is approximately equal to 365.26 mean solar days.

LINES ON THE MAP

1. **Contours :** Lines passing through places of same heights above sealevel.
2. **Isotherms :** Lines passing through places of same mean temperature.
3. **Isobars :** Lines passing through place of same atmospheric pressure.
4. **Isohels :** Lines passing through places of same duration of sunshine,
5. **Isohyets :** Lines passing through places of same mean rainfall.
6. **Isonephhs :** Lines passing through places having same average cloudiness over a certain period.
7. **Isopleths :** Lines on a map drawn through places having the same value of a certain element. Isobars isohyets etc. are isopleths.
8. **Equigravisphere :** An imaginary sphere described with the centre of the earth as its centre and mean radius of the earth as its radius.

ATMOSPHERIC PHENOMENA

1. *The regions on and over the surface of the Earth :*
 - (i) **Lithosphere :** The solid crust, consisting of Soil and hard rock, several miles in thickness on which the continents of hard mass have been formed.
 - (ii) **Hydrosphere :** All the water of the earth, including the oceans, lakes, rivers, ice sheets and the water in atmosphere.

(iii) **Atmosphere** : The envelope of air which surrounds the earth. It is a mixture of gases - Nitrogen 78%, oxygen 21% and carbondioxide-argon and other inter gases. The atmosphere is necessary for the survival of life on earth. the pressure of the atmosphere is 76 cm. of Mercury at sea-level.

(iv) **Biosphere** : That portion of the various forms of life.

(v) **Magnetosphere** : The space surrounding the Earth or any celestial body, in which there is a magnetic field associated with that body (about 64000 km above the surface).

2. **Layers of the atmosphere :**

(i) **Troposphere** : The lowest thick layer of atmosphere, extending on an average, up to 10 kms above the earth's Surface - a region of clouds, dust, water vapour and wather. The boundary layer which separates troposphere from stratosphere is known as the Tropopause.

(ii) **Stratosphere** : The region above the troposphere - about 16 kms thick - since weather does not affect this region, modern jets fly in this region.

(iii) **Mesosphere** : A zone of chemical reactions

(IV) **Ionosphere** : The region of nuclear reactions - the atmosphere almost completely ionized as a result of the ultra - violet rays and X rays of the sun - useful for radio transmission - communication satellites situated in this region - extends upto 400 kms.

(V) **Exosphere** : The outer - most layers of atmosphere - gas very rare atoms collide and sometimes escape into outer space - upto 1000 Kms above earth's surface.

3. **Rain** : Three kinds are

(i) **orographic (Relief) rain** : is caused by the surface relief of the land, mainly, by the presence of mountain ranges - heavy rain on the windward side and scanty rain on the leeward side.

(ii) convection rain : caused when moist winds are drawn into the convection currents of a hot region - generally occurs in Equatorial regions - the thundery rain of a summer afternoon is a typical example.

(iii) cyclonic rain : associated with the passage of a cyclone or depression.

4. *Rain fall* : Main determinants of rainfall are latitude, distance from sea, direction of winds, mountains and seasons. The average annual rainfall in India is 100 cm. Regions of heavy rainfall : Assam, the Himalayan slope, West coast and the western Ghats. Regions of scanty rainfall : Kashmir, South West Punjab, West Rajasthan, Kutch.

5. *Wind* : A current of Air ; Wind belts are formed by streams of air moving over the surface of the earth - Anemometer measures the direction and speed of the wind - owing to the earth's rotation, all the winds are deflected, to the right in the norther hemisphere and to the left in the Southern hemisphere.

6. **Types of Winds :**

(i) Periodic : Sea breeze and land breeze, monsoon.

(ii) constant (Planetary) : Trade winds, westerlies and easterlies

(iii) Variable : Tropical storms, anticyclone, whirlwind.

7. *Sea breeze and land breeze* : In a place near the sea, the temperature of the land during day time is higher than that of the sea water nearby and so air over land is at a low pressure and air over sea at a high pressure. So a wind current from the sea to the land is set up. This is known as sea breeze which is full of moisture and brings relief in the hot - after noons. The conditions are reversed in a land breeze which blows from the land to the sea during the later part of the night and is dry.

8. *Monsoon* : The seasonal winds which are prominently felt in South East Asia and India - two systems, South-

West and North-East in summer South-West monsoon brings rain to China, South East Asia and India. In India S.W. Monsoon accounts for 90% of the total rainfall in winter, North-East monsoon brings rain to the East Coast of India (Tamil Nadu, Orissa and Andhra) and Punjab.

9. Trade winds : The winds which blow from the subtropical belts of high pressure towards the equatorial region of low pressure. Those winds blow regularly throughout the year in many areas, especially the oceans and hot deserts-directions : from north-east in the northern hemisphere-bring little rain.
10. Westerlies (Westerly winds) : The winds which blow with great frequency from the Horse latitudes towards the polar region. The direction : from the south-west blows throughout the year with varying intensity—cause rain near the polar regions.
11. Roaring Forties : The name given to westerlies which blow near Australia particularly vehement.
12. Easterlies (Polar winds) : The extremely cold winds which blow from the area of high pressure around the Poles towards the temperate regions,
13. Doldrums : The equatorial belt of low atmospheric pressure where the North-East and South-East Trade winds coverage-a region of calmness-the calm periodically disturbed by storms, accompanied by heavy rains.
14. Horse latitudes : The subtropical belts of high atmospheric pressure over oceans (near 30° latitude) between the regions of the Trade winds and the westerlies—regions of calm, light variable winds and dry air.
15. Tropical Storms : Those storms, originating generally in the sea areas near land in Doldrums. are known by different names in different places.

Cyclones : in the Indian Sub continent and the Southern Indian ocean

Typhoon : In Philippines Japan and China

Hurricane : In West Indies and U.S.A,

Willy-Willy : In Australia

A tropical storm is similar to a Depression but smaller and much more intense. At the centre of the storm, known as the Eye of the storm, atmospheric pressure is very low—beyond this, there are the eye-wall clouds—the winds accompanied by rain and thunder lash towards the Eye in this region in spirals of anti-clock wise direction in the northern hemisphere—the relatively calm.

16. **Anti-cyclone** : A region in which the atmospheric pressure is high compared with that of adjacent areas—belts of permanent anti-cyclones are formed near the horse latitudes—the winds blow out in spirals in the clockwise direction in northern hemisphere—do not cause much havoc as cyclones.
17. **Tornadoes** : an extremely violent whirlwind, covering a small area—sometimes winds velocities exceeds 200 miles/per hour—through a local phenomenon, may travel upto 20 miles—an area of low pressure at the centre—occurs frequently in the Mississippi basin of the U.S.A. and Sahara.
18. **Blizzard** : A storm of powder snow, driven along by an abnormally high-wind, reducing visibility to zero—a special type of cold wave—occurs occasionally in U.S.A. and Canada and is very frequent in some localities of the polar regions.
19. **Dust devil** : A local whirlwind of dust, usually not more than a few yards in diameter, in which particles are swept round the centre and are lifted to considerable heights.
20. **Dust Storm** : A storm in which a thick mass of dust obscures the atmosphere and reduces visibility very much—danger to aviation—frequent occurrence in India, North Africa and North West India—thundary weather without rain.
21. **Sandstorm** : A storm in which a mass of relatively coarse sand is blown along through the air by a strong wind.
22. **Weather** : The condition of the atmosphere at any time or over a short period, as described by

meteorological phenomena like atmosphere pressure, temperature, humidity, rainfall, cloudiness, wind etc.

23. **Climate** : The average weather conditions of a place or region throughout the seasons—depends on numerous factors like latitude, positions relative to continents and oceans altitude of the place, proximity of mountains etc. Near the equator, climate is almost the same as weather.
24. **Climatic Regions of the World** : The main areas into which the earth is divided according to climate—the four principal climatic regions are the tropical, sub-tropical, temperate and polar.
25. **The tropical climatic region** : Has four sub-divisions
 - (i) **Equatorial climate** : Experienced within 10° latitude of the equator—high temperature and humidity, slight seasonal variations, heavy rainfall without any dry season.
 - (ii) **Monsoon climate** : Monsoon winds predominate—the effects of the Trade winds not felt much seasonal rains.
 - (iii) **Savanna (Sudan type) Climate** : Savannas are regions which lie between the equatorial forests and the hot deserts in each hemisphere—distinct wet and dry seasons—vegetation, grass with scattered trees—cattle—rearing possible because of extensive grasslands—e.g. Illons of the Orinoco basin and Campos and Selvas of Brazil (Amazon basin) extensive areas in Africa. , particularly Sudan.
 - (iv) **Desert Climate** Salient feature, aridity or lack of rainfall—generally occurs only in continental interiors—many deserts found in the horse latitude areas of high pressure two types of deserts are (a) the hot deserts near horse latitude e.g. Sahara, Arabia, Central Australia, Thar (India), Kalahari, Atacama (b) midlatitude deserts e.g. Gobi in Mongolia and Turkestan in U.S.S.R. (These are in the temperate climatic region)

26. *The sub-tropical climatic regions* : of two types
 - (i) Mediterranean or dry sub-tropical climate. The types of climate experienced by the lands bordering the Mediterranean Sea.
 - (ii) Cotton belt climate or wet sub-tropical climate ; The belt of land in south eastern U.S.A. which produces sizable quantities of world's cotton.
27. *Temperate climatic region* : of two kinds.
 - (i) Continental climate : The type of climate experienced in the interior of the great continents, especially in the temperate zone of the northern hemisphere—characterized by extremes of temperature and relatively low rainfall.
 - (ii) Maritime climate : A climate which is mainly influenced by the proximity of the sea—comparatively cool summers and warm winters. Similar to this is the *insular climate* of islands and sea-shores.
28. *Polar climatic region*
 - (i) Ice-cap climate : the type to be found over the polar ice-caps or ice sheets of Antarctica and Greenland—may be regarded as cold deserts—the mean annual temperature well below 0°C.
 - (ii) Tundra : The treeless plains of North America and northern Eurasia lying within the Arctic circle—no corresponding region in the Southern hemisphere—vegetation scanty—reindeer the only animal which is the source of meat and dress to the poor inhabitants.
29. *Steppes* : The mid-latitude (temperate) grassland of U.S. S.R.—treeless plains.
30. *Prairies* : Extensive woodless, flat, grassy plains of Southern Canada and Central U.S.A.—tall grass—ideal for cattle rearing—the most important areas of wheat production.
31. *Pampas* : The mid-latitude grasslands in Argentina, lying round the River Plate—Cattle and cultivation.

32. **Veld** : Elevated open treeless grasslands of South Africa—similar to steppes etc.

INTERIOR OF THE EARTH

1. **Earth's Crust** : On which the continents and oceans stand thickness varies from 40 Km to 10 Km—the most abundant element in its oxygen (60%).
2. **Continental Shelf** : The sea bed, bordering the continents, which is covered by shallow water—it takes the form of a shelf sloping gently downwards from the coast—beyond the shelf there is a sharp drop in the sea bed.
3. **Territorial Waters** : For a country having sea-shore, the territorial water extend upto 12 nautical miles from the mean coastline.
4. **Contiguous Zone** : Between 12 and 24 nautical miles from the mean coast line.
5. **Ore and minerals** : Mineral is a natural inorganic substance which possesses a definite chemical composition and definite physical and chemical properties e.g. Monazite. Ilmenite. Ore is a mineral aggregate which is worth mining on account of the valuable minerals in it. Ore contains rock along with minerals.
6. **Exclusive Economic Zone** : Extends upto 200 nautical miles continental shelf whichever is more.

Note : These terms are legally defined, as applicable to India. Within the territorial waters of India, sea vessels of their countries have a limited right of use. In the contiguous zone, India has certain special rights regarding customs; but the non-military vessels of other countries have general right of use. In the EEZ, India has only economic rights i.e., for exploitation of mineral wealth and fishing.

7. **Artesian well** : A type of well which normally gives a continuous flow, the water being forced up hydrostatic pressure the depth may vary from a few feet to thousands of feet—an important source of irrigation in semi-arid regions.
8. **Mineral Spring** : A natural spring is a continuous or intermittent flow of water from the ground. A spring

which contains a noticeable quantity of mineral matter in solution e.g. Sulphur spring, saline spring etc.

9. *Geyser* : A hot spring which, at intervals, throws a jet of hot water and steam into air—generally occurs in a volcanic region e.g. Yellowstone Park, U.S.A.
10. *Earthquake* : A movement of the earth's crust which originates naturally and below the surface of the earth—may be caused by volcanic eruptions or by the breaking of the strata of the earth's crust, out of the thousands of earthquakes which take place every year, only a few are really disastrous—the earthquake regions of the world are the west coast of North and South America, South East Asia, New Zealand, India the Middle East and the Mediterraneans.
11. *Epicentre* : The point on the earth's surface which is vertically above the point of the origin of an earthquake the point of origins Seismic focus.
12. *Seismograph* : An instrument which records the intensity of the earth-quake at any particular place—by reading the seismographs of two or more places, the epicentre of an earthquake can be fixed. Intensity of earthquake at a place is measured in Richter Scale depending on the extent of damages.
13. *Volcano* : An opening in the earth's crust by magma forcing its way to the surface—generally the lava takes the form of a conical hill—the molten material which exists below the solid rock is known as Magma—when the magma reaches the surface during eruption, it becomes lava.

ROCKS AND MOUNTAINS

1. **Type of rocks :**

(i) *Sedimentary rocks (stratified)* : rocks which have been laid down in beds or layers, often as sediments e.g., Sandstone, limestone, shale, coal—these rocks are of much economic importance since most of the world's minerals wealth is situated in them.

(ii) *Igneous rocks* : are formed by the cooling of the molten material which comes out of the interior of the earth e.g. lava, granite, quartz etc.

- (iii) *Metamorphic rocks* : Igneous or sedimentary rocks which have changed their form in course of time—crystalline shape e.g. marble, slate, diamond.

2. **Mountain Types :**

- (i) *Fold Mountains* : Mountains which have been thrown up into a massive fold by earth movements e.g. The Himalayas, the Andes, the Alps.
 - (ii) *Block mountains* : A small mount formed by the uplift of land between faults.
3. **Snow-line** : The imaginary line on a mountain slope above which there is perpetual snow.
 4. **Glacier** : Consolidated masses of ice which move slowly down a valley from above the snowline towards the sea under the force of gravity.
 5. **Avalanche** : A vast mass of snow and ice at high altitude which has accumulated to such an extent that its base gives way and causes it to slide rapidly down the mountains slope, often carrying with it thousands of tons of rock.
 6. **Canyon** ; A gorge of a large size e.g. the Grand Canyon of the Colorado river, U.S.A.

LAND

1. **Plateau** : an extensive level or near level area of elevated land e.g. the Deccan, the Tibet.
2. **Tableland** : A plateau bounded by steep faces which lead abruptly down to sea or the adjoining low land many tablelands in South Africa.
3. **Peneplain** : A region which is almost a plain.
4. **Hinterland** : The region which lies behind a port and supplies the bulk of its exports and in which most of its imports are distributed.
5. **Rainshadow** : An area which lies behind a mountain range and hence has a low rainfall e.g. the leeward side of the Western Ghats.
6. **Enclave** : An outlying territory belonging to one country which lies wholly within the territory of another country or is, on one side, bordered by the sea e.g. Cabinda of Angola.

7. **Peninsula** : A land mass which is almost surrounded by water on all sides e.g. Indian Peninsula, the Arabian Peninsula.
8. **Isthmus** : a very narrow strip of land which connects two large land masses e.g. Suez and Panama.
9. **Strait** : A small strip of water connecting two seas or oceans e.g. Bosphorus, Gibraltar, Palk.
10. **Oasis** : An area in the midst of a desert, which is made fertile by the presence of water.
11. **Sand dunes** : Small hillocks of loose sand, formed in deserts and along sea coasts.
12. **Dyke** : A bank of earth or stones, constructed to prevent lowlying land from being flooded by the sea or a river. e.g. in Holland.
13. *Types of forests* :
 - (i) **Coniferous** : A forest of ever-green, cone-bearing trees carrying needle-shaped leaves—the main product : Soft-wood timber—found in Northern Canada and Northern Eurasia.
 - (ii) **Deciduous** : A forest of trees which shed their leaves at some season of the year—found in monsoon areas and temperate zone—main product : hard wood timber like teak, oak, and elm.
 - (iii) **Tropical rain forests (Equatorial forest)** : The hot, wet of the equatorial region where the rainfall is heavy—main product : Tropical hard-wood like ebony and mahogany—also wild rubber tree—found in the basins of the Amazon and the Congo and in the East Indies.
 - (iv) **Monsoon** : The type of tropical forest that is characteristic of regions experiencing the true monsoon climate—main products : teak and sal found in India and other parts of South East Asia.
 - (v) **Thorn forest** : A forest of small, thorny trees in a tropical or sub-tropical region where rainfall is too scanty to permit the growth of normal forests.
14. **Afforestation** : The process of transforming an area into forest, usually when trees have not grown there previously.

15. *Reforestation* : The planting of trees on land where a forest has previously stood but has been destroyed.

Deforestation : The process of clearing forests.

16. *Cultivation* :

(i) *Extensive cultivation* : A system of farming by which the cultivator expends a limited amount of labour and capital on a relatively large area.

(ii) *Intensive cultivation* : A system of farming by which the cultivator expends much labour and capital on a relatively small area.

(iii) *Dry farming* : A method of farming without irrigation in an area of limited rainfall, the land being treated so to conserve the moisture.

(iv) *Pastoral farming* : The practice of breeding and rearing certain herbivorous animals-inhabitants of Tundra, deserts and semi deserts resort to it and generally lead a nomadic life.

(v) *Shifting cultivation* : A primitive form of agriculture, in which a plot of land is cultivated for a few years and then is deserted—ground cleared by destroying forests—chiefly found in the tropics—e.g. Jhooming in Mizoram and Nagaland.

(vi) *Subsistence farming* : the type of farming in which the produce is consumed mainly by the farmer and is not sold.

(vii) *Mixed farming* : The combination of agriculture and pastoral farming.

(viii) *Truck farming (Market gardening)* : The intensive cultivation of vegetable crops, fruits and flowers for market—the use of trucks for transporting the produce of market.

(ix) *Terrace cultivation* : An agricultural system by which mountain and hill slopes are cultivated—found in the Andes, Mediterranean countries, China etc.

17. *Crops* : (i) *Cash crops* : Crops which are produced for sale and not for consumption of the farmer, e.g. grapes, groundnut, cotton etc. (ii) *Subsistence crops* : Crops produced in subsistence farming—meant mainly for consumption of the

farmer e.g. food crops, (iii) Plantation crop : Crops produced in plantations i.e. estates, usually, in tropical (or subtropical) region which is devoted to the large-scale production of cash crops. e.g. tea, coffee, sugarcane.

18. *Crop seasons :*

1. Kharif : rice, jowar, bajra, maize, cotton, sugarcane, groundnut
2. Rabi : Wheat, barley, jowar, linseed, mustard, gram
3. Summer : rice, maize, groundnut

19. *Irrigation :*

- (i) Basin irrigation : The flood waters of rivers are used in the area.
- (ii) Perennial irrigation : the waters of perennial rivers are utilised.
- (iii) Canal irrigation : Makes use of the waters in dam or barrages through canals—gravitational flow.
- (iv) Lift irrigation : The water of a river are lifted through pump-pis for utilisation at a higher level.
- (v) Tank irrigation : is seasonal -mainly used in the Deccan in India
- (vi) Well : An important source of irrigation all over India, particularly in U.P. and Punjab.

Rivers and Seas

1. Tributary : A river or stream which contributes its water to a main river e.g. the Yamuna.
2. Distributary : A branch or outlet which leaves a main river and does not rejoin it, carrying its water to the sea or a lake.
3. Delta : A triangular shaped alluvial tract formed at the mouth of a river e.g. the delta of the Ganges (the largest delta in the world).
4. Doab : The alluvial tract of land between two adjacent rivers. e.g. the plain between the Ganges and Jamuna.
5. Catchment basin (Drainage area) : The region which drains all the river water that falls on it into a river or stream.
6. Breakwater : A barrier built into the sea in order to break the force of the waves and thus to serve as a protection against them.

7. Estuary : The mouth of a river where tidal effects are felt and where fresh water and sea water mix. e.g. the Thames Estuary in London.

8. Ocean currents : A movement of the surface water of the ocean—main causes : winds, differences in density due to variations in temperature of salinity—cold or warm ocean currents.

9. Some warm ocean currents : 1. Gulf stream ; from the Gulf of Mexico towards European west coast. 2. Kuro Shio : From the east coast of Japan towards the West coast of Canada and U.S.A.

10. Some cold ocean currents : 1. Labrador currents : From the North of the East coast of Canada to the South. 2. South Indian Current : From below Africa towards south of Australia.

11. Tide : (1) The alternate rise the fall of the surface of the sea, approximately twice a day, caused by the gravitational pull of the moon and the sun—caused mainly by the gravitational attraction of the moon.

(2) High tide : When the intensity of the wave is great, the tides are of considerable height and so the sea water comes over the cost to some extent, such waves are known as high tides.

3. Low tide : When the height of the tide is not much, sea-water recedes from the shore. Such a tide is called a low tide.

4. Spring tide : When the amplitude of the tides is maximum—occur on new moon and full moon days—high tides very high and low tides very low on those days.

5. Nea-p tide : When the amplitude of the tides is minimum—occurs on the first quarter and last quarter of moon—high tides comparatively low and low tides comparatively high.

12. Nautical Mile : A unit of distance used in navigation equal to 6081 feet.

Knot : A unit of speed equal to one nautical mile per hour.

13 : Coral reef of island : A chain of rocks, lying near the surface of the sea, built up principally by immense numbers of coral polyps. (Coral : Small marine animal)

14. Lagoon : Shallow stretch of water which is partly or fully separated from the sea by a narrow strip of land.

15. Atoll : A coral reef in the shape of a ring or horse shoe, enclosing a lagoon.

16. Archipelago : A group of islands.

17. Littoral : The sea shore, the strip of land along a sea coast or more strictly, the land lying between high and low tide levels.

Indian Geography

I. BASIC DATA

<i>India/State/Union Territory</i>	<i>Capital</i>	<i>Area in sq km (000)</i>	<i>Population 1981</i>	<i>Density of Population per sq. km</i>
<i>India</i>	<i>New Delhi</i>	<i>2,387.3</i>	<i>6,85,184,692</i>	<i>216</i>
1. Andhra Pradesh	Hyderabad	275.1	5,35,49,673	195
2. Assam	Guwahati	78.4	1,98,96,843	254
3. Bihar	Patna	173.9	6,99,14,734	402
4. Gujarat	Gandhinagar	196.10	3,40,85,799	174
5. Haryana	Chandigarh	44.2	1,29,22,618	292
6. Himachal Pradesh	Simla	55.7	42,80,818	77
7. Jamu and Kashmir	Sri Nagar	222.2	59,87,389	59
8. Karnataka	Bangalore	191.8	3,71,35,714	194
9. Kerala	Trivandrum	38.9	2,54,53,680	655

10. Madhya Pradesh	Bhopal	443.5	2,21,78,844	118
11. Maharashtra	Bombay	307.7	6,27,84,171	204
12. Manipur	Imphal	22.3	14,20,953	64
13. Meghalaya	Shillong	22.4	13,35,819	60
14. Nagaland	Kohima	16.6	7,74,930	47
15. Orissa	Bhubaneswar	155.7	2,63,70,271	169
16. Punjab	Chandigarh	50.4	1,67,88,915	333
17. Rajasthan	Jaipur	342.2	3,42,61,862	100
18. Sikkim	Gangtok	7.1	3,16,385	45
19. Tamil Nadu	Madras	130.1	4,85,08,077	372
20. Tripura	Agartala	10.5	20,53,058	196
21. Uttar Pradesh	Lucknow	294.4	11,08,62,013	377
22. West Bengal	Calcutta	88.8	5,45,80,647	615
1. Andaman and Nicobar Islands	Port Blair	8.2	1,88,741	23
2. Arunachal Pradesh	Itanagar	83.7	6,31,839	8
3. Chandigarh	Chandigarh	0.1	4,51,610	3,961
4. Dadra and Nagar Haveli	Silvassa	0.5	1,03,676	211
5. Delhi	Delhi	1.5	62,20,406	4,146
6. Goa, Daman and Diu	Panaji	3.8	10,86,730	285
7. Lakshadweep	Kavaratti	(0.03)	40,249	1,258
8. Mizoram	Aizawaal	21.1	4,93,757	23
9. Pondicherry	Pondicherry	0.5	6,04,471	1,229

II. Important Places in India

Adam's Bridge : (Tamil Nadu) A bridge connecting Dhanushkodi, a tip of India, with Mannar peninsula in Sri Lanka.

Adyar : (Madras) The headquarters of the Theosophical Society of India.

Agra : (Uttar Pradesh) Famous for the Taj Mahal, Agra Fort, Peari Mosque and Sikandra, the tomb of Akbar.

Ahmedabad : (Gujarat) Important centre for cotton textiles.

Aligarh : Seat of the Muslim university; famous for locks and cutlery.

Allahabad : (Uttar Pradesh) Situated at the confluence of three rivers, the Ganga, the Yamuna and the mythical Saraswati; a place of pilgrimage for Hindus; seat of a university.

Alwaye : (Kerala) Famous for fertilizer and monazite factories.

Amarnath : (Kashmir) An important cave temple; a famous pilgrim centre for Hindus.

Anritsar : (Punjab) A border town in the Punjab founded by Guru Ram Das; famous for Golden Temple, a place of pilgrimage for the Sikhs.

Anand : (Gujarat) Famous for Amul Milk and Dairy Plants.

Ankleshwar : (Gujarat) Famous for oil and natural gas.

Arvi : (Maharashtra) Satellite Communication Earth Station.

Aurangabad : (Maharashtra) Famous for Ajanta and Ellora caves nearby.

Badrinath : (Uttar Pradesh) A temple near Gangotri glacier; an important place of pilgrimage for Hindus.

Bailadila : (Madhya Pradesh) The biggest iron ore mining complex in the country.

Banaras : (Varanasi) (Uttar Pradesh) A holy place for Hindus; seat of a university; famous for silk sarees, brassware, diesel locomotive engine factory.

Bangalore : (Karnataka) Famous for Hindustan Aircraft Factory, Bharat Electronics Ltd., Indian Telephone Industries, Hindustan Machine Tools, Indian Institute of Science.

Bhilai : (Madhya Pradesh) A big steel plant constructed with the Russian collaboration.

Bhopal : (Madhya Pradesh) Famous for Bharat Heavy Electricals Ltd. Factory.

Bijapur : (Karnataka) Famous for the largest dome in the world Gol Gumbaj.

Bodh Gaya : (Bihar) Lord Buddha got enlightenment here under the Mahabodhi tree; a place of pilgrimage for Buddhists.

Bokaro : (Bihar) Iron and Steel plant with Russian collaboration.

Bombay : (Maharashtra) The second biggest city of India; the biggest centre of cotton and synthetic textiles; film industry; oil refinery; fertilizer factory.

Bambay High : (Off Bombay) India's most promising offshore oilfields in the Arabian Sea near Bombay.

Calcutta : (West Bengal) The largest city of India; an industrial centre for jute, cotton and paper mills; famous Victoria Memorial. Dakshineswar Temple.

Cape Comorin : (Tamil Nadu) The southern most tip of India; the place where the Arabian Sea and the Bay of Bengal meet the Indian Ocean; famous for a temple dedicated to the virgin goddess Kanyakumari; Vivekanand Mandapam and Gandhi Mandapam.

Cherrapunji : (Assam) Known to be the wettest place in the world; average annual rainfall 1,079 cm.

Chidambaram : (Tamil Nadu) Famous for Nataraja Temple.

Chittaranjan : (West Bengal) Famous for locomotives factory.

Chittorgarh : (Rajasthan) Famous for its Jai Stambha (Tower of Victory).

Chushul : (Ladakh) Highest aerodrome in India.

Conjipuram : (Tamil Nadu) Noted for Hindu temples and silk sarees.

Darjeeling : (West Bengal) H famous hill station; well known for tea, oranges and cinchona.

Dehra Dun : (Uttar Pradesh) Famous for Indian Military Academy and the Defence Science Laboratory; noted for timber and forest products.

Delhi : Famous for historical buildings like Red Fort, Jama Masjid, Qutb Minar, Raj Ghat, Shanti Van; an important centre for trade and industry, textiles, electronics, ivory carvings.

Dhanbad : (Bihar) Famous for coal mines. Indian School of Mining and National Fuel Research Institute.

Dhariwal : (Punjab) Famous for its wollen goods.

Digboi (Assam) Known for its oil fields and oil refinery.

Dindigul (Tamil Nadu) Famous for cigars and tobacco products.

Durgapur : (West Bengal) Famous for its steel plant with British collaborotion.

Faridabad : (Haryana) The biggest industrial complex in North India.

Firozabad : (Uttar Pradesh) Famous for glass bangles industry.

Garhmukteshwar : (Uttar Pradesh) Famous for a religious of Hindus.

Ghaziipur : (Uttar Pradesh) Government opium factory.

Gomia : (Bihar) Known for explosive factory.

Gorakhpur : (Uttar Pradesh) Timber, sugar and fertilizer factories.

Guntur : (Andhra Pradesh) Textile and tobacco factories

Gwalior : (Madhya Pradesh) Textile pottery and cement Industries.

Haldia (West Bengal) Famous for a huge oil refinery set up in collaboration with Rumania and France.

Hampi : (Karnataka) Known for the ruins of the ancient capital of Viivayanagar kingdom

Hardwar : (Uttar Pradesh) : A place of Hindu pilgrimage ; Bharat Heavy Electricals Ltd. factory.

Hyderabad : (Andhra Pradesh) Seat of Osmania University, famous for asbestos sheet factories, a factory of the Hindustan Machine Tools.

Jabalpur : (Madhya Pradesh) Famous for marble quarries.

Jadugoda : (Bihar) Known for uranium ore mill.

Jaipur : (Rajasthan) Known as Pink City ; famous for pottery, marble, embroidery and (brassware ; also famous for Hawa Mahal and Amber Fort.

Jamshedpur (Bihar) Famous for Tata Iron and Steel Factory.

Jawalamukhi : (Himachal Pradesh) Natural gas.

Jharia : (Bihar) An important centre of coal industry.

Jog Falls : (Karnataka) Famous waterfalls across the Sharavati River.

Kanpur : (Uttar Pradesh) Famous for sugar, cotton, woollen textiles, leather and aircraft industry.

Kasauli : Hill station ; Pasteur Institute.

Kavaloor : (Tamil Nadu) Famous for Satellite Tracking Station built with Soviet collaboration.

Kedarnath : (Uttar Pradesh) An important centre of pilgrimage for Hindus.

Khadakvasla : (Pune) Famous for National Defence Academy.

KhojuraHo : (Madhya Pradesh) Famous for the magnificent Mahadev Temple and other temples; an important tourist centre.

Khetri : (Rajasthan) Famous for copper mines.

Kodarma : (Bihar) Famous for mica mining.

Kodaikanal : (Tamil Nadu) An important hill station

Kolar : (Karnataka) Famous for gold mines.

Konark : (Orissa) Famous for Sun Temple and Black Pagoda.

Koraput : (Orissa) MIG engines factory.

Korba : (Madhya Pradesh) Coal mines; thermal power plant; public sector aluminium plant; fertilizer plant-

Koyali : (Gujarat) Electro-chemical complex.

Koyana : (Maharashtra) Hydel Power Station which supplies electricity to Greater Bombay Pune.

Kurukshetra : (Haryana) Legendary place of the Mahabharata war.

Leh : (Capital of Ladakh in Jammu and Kashmir) A military station of strategic importance.

Ludhiana : (Punjab) Famous for hosiery, cycle parts and sewing machine parts.

Madras : (Tamil Nadu) Well-known for leather industry.

Madurai : (Tamil Nadu) Cotton textile centre; famous for Meenakshi Temple.

Mahabalipuram : (Tamil Nadu) Well-known for rock-cut temples, specimen of Pallava art and architecture.

Mathura : (Uttar Pradesh) The birth place of Lord Krishna; the biggest oil refinery of the country.

Mussoorie : (Uttar Pradesh) Hill Station; Lal Bahadur Shastri Academy of Administration.

Nagpur : (Maharashtra) Famous for oranges, cotton tiles.

Nalanda : (Bihar) Seat of an ancient Buddhist university.

Nasik : (Maharashtra) A place of pilgrimage for Hindus; Security Currency Printing Press; MIG Factory.

Nepa Nagar : (Madhya Pradesh) Known for the newsprint factory.

Neyveli : (Tamil Nadu) Thermal power station and monazite factory.

Nunmati : (Assam) Oil refinery in public sector,

Ooty : (Tamil Nadu) An important hill station in the Nilgiri Hills; photo film industry; Botanical Gardens.

Panaji : (Goa) National Institute of Oceanography.

Panipat : (Haryana) Three famous battles were fought here in 1526, 1556 and 1761 A.D.

Panna : (Madhya Pradesh) Famous for diamond mines.

Paradip : (Orissa) An important major port on the east coast of India.

Peenya : (Karnataka) Satellite construction centre.

Perambur : (Madras) Known for Integral Coach Factory.

Pilani : (Rajasthan) Birla Institute of Technology and Science.

Pimpri : (Pune) Famous for penicillin factory.

Polcharan : (Rajasthan) India's first nuclear explosion was carried out here in 1974.

Porbandar : (Gujarat) The birth place of Gandhi.

Pune (Poona) : (Maharashtra) Famous for cotton textiles, sugar, silk and rice; an important military centre.

Puri : (Orissa) Famous for Jagannath Temple.

Pushkar : (Rajasthan) Famous for Brahma Temple.

Rajgir : (Bihar) Famous for Jain temples and hot water springs.

Kota : (Rana Pratap Sagar) (Rajasthan) Atomic power station.

Ranchi : (Bihar) Famous for Heavy Engineering Plant.

Roorkee : (Uttar Pradesh) Seat of an engineering university; Central Building Research Institute.

Rourkela : (Bihar) An Iron and Steel Plant with West German collaboration and a fertilizer factory.

Sabarmati : (Ahmedabad) Gandhi's Harijan Ashram.

Sambhar : (Rajasthan) Salt lake.

Shantiniketan : (Calcutta) The seat of the famous Vishwa Bharati University founded by Rabindranath Tagore,

Tarapur : (Bombay) Atomic Power Plant.

Thumba : (Kerala) Equatorial Rocket launching station.

Tirupati : (Andhra Pradesh) Known for Sri Venkateshwara temple.

Titaghur : (West Bengal) Famous for paper and jute industries.

Trombay : (Maharashtra) Known for oil refineries; B.A. R.C., and fertilizer factory.

Udaipur : (Rajasthan) The most beautiful city in Rajasthan; called the 'city of lakes'; cement factory.

Ujjain : (Madhya Pradesh) Famous for its temples.

Vishakhapatnam : (Andhra Pradesh) A major port on the east coast of India; famous for ship-building industry and oil refineries.

Wardha : (Maharashtra) A centre of cotton trade; Gandhi had an ashram here.

III. INDIAN TOWNS SITUATED ON RIVERS

<i>Town</i>	<i>River</i>
Agra	Jamuna
Allahabad	Ganges and Jamuna
Ayodhya	Saryu
Badrinath	Ganges
Calcutta	Hooghly
Cuttack	Mahanadi
Delhi	Jamuna
Dibrugarh	Brahmaputra
Ferozepore	Sutlej
Gauhati	Brahmaputra
Hardwar	Ganges
Hyderabad	Musi
Jabalpur	Narbada
Kanpur	Ganges
Kotah	Chambal
Leh	Indus
Lucknow	Gomti
Ludhiana	Sutlej
Nasik	Godavari
Pandharpur	Bhima
Patna	Ganges
Srinagar	Jhelum
Surat	Tapti
Varanasi	Ganges
Vijayawada	Krishna

IV. MINERAL PRODUCING STATES IN INDIA

Bauxite : Bihar, Andhra Pradesh, Goa, Gujarat, Jammu and Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Rajasthan, Tamil Nadu & Uttar Pradesh.

Coal and Lignite. West Bengal, Andhra Pradesh, Bihar, Madhya Pradesh, Maharashtra, Orissa, (Gondwana formation): Arunachal Pradesh, Assam, Meghalaya, Jammu and Kashmir and Nagaland (tertiary formations) :

Tamil Nadu, Gujarat, Jammu and Kashmir, Rajasthan (lignite).

Chromite. Andhra Pradesh, Bihar, Karnataka, Maharashtra, Manipur, Orissa and Tamil Nadu.

Copper Ore. Andhra Pradesh, Bihar, Gujarat, Karnataka, Madhya Pradesh, Rajasthan, Sikkim.

Diamond. Madhya Pradesh. Uttar Pradesh.

Gold : Karnataka, Andhra Pradesh.

Gypsum : Rajasthan, Jammu and Kashmir and Tamil Nadu.

Ilmenite : Kerala, Orissa and Tamil Nadu

Iron Ore : Bihar, Goa, Karnataka, Madhya Pradesh, Maharashtra, Tamil Nadu, and Orissa,

Lead Zinc Ore : Rajasthan, Andhra Pradesh, Gujarat and Orissa.

Manganese Ore ; Madhya Pradesh, Andhra Pradesh, Goa, Gujarat, Karnataka, Maharashtra and Orissa.

Mica. Andhra Pradesh, Bihar and Rajasthan.

Nickel Ore : Orissa :

Oil : Assam, Tripura. Manipur, West Bengal, Himachal Pradesh (on shore areas) West Bengal, Orissa, Andhra Pradesh, Tamil Nadu, Karnataka, Maharashtra and Gujarat (off-shore).

Phosphorite : Madhya Pradesh, Rajasthan, and Uttar Pradesh.

Apatite : Andhra Pradesh, Rajasthan, West Bengal and Tamil Nadu.

Magnesite : Tamil Nadu, Uttar Pradesh and Karnataka.

Kyanite : Bihar, Maharashtra, Karnataka.

IV. MAJOR MULTI-PURPOSE PROJECTS IN INDIA

<i>Project</i>	<i>River</i>	<i>States</i>	<i>Purpose</i>
Nagarjuna Sagar	Krishna	Andhra Pradesh	
Tungabhadra	Tungabhadra	Andhra Pradesh & Karnataka	Irrigation
Pochampad	Godavari	Andhra Pradesh	Irrigation
Gandak	Gandak	Bihar, Uttar Pradesh and Nepal	Irrigation
Kosi	Kosi	Bihar	Irrigation & flood control
Kakrapara	Tapi	Gujarat	Irrigation
Mahi	Mahi	Gujarat	Irrigation
Ukai	Tapi	Gujarat	Irrigation & Hydroelectric power
Bhadra	Bhadra	Karnataka	Irrigation & power generation.
Ghataprabha	Ghataprabha	Karnataka	Irrigation
Malaprabha	Malaprabha	Karnataka	Irrigation
Upper Krishna	& Krishna	Karnataka	Irrigation
Chambal	Chambal- Rana Partap Sagar Dam	Madhya Pradesh Rajasthan	Irrigation & power generation
Tawa	Tawa	Madhya Pradesh	Irrigation
Bhima	Pawana & Krishna	Maharashtra	Irrigation
Jayakwadi	Godavari	Maharashtra	Irrigation
Hirakud	Mahanadi	Orissa	Irrigation & power generation.
Mahanadi Delta		Orissa	Irrigation
Bhakra Nangal	Sutlej	Haryana, Punjab and Rajasthan	Irrigation
Beas	Beas and Sutlej	Punjab, Haryana, and Rajasthan.	Irrigation & power generation.

<i>Project</i>	<i>River</i>	<i>States</i>	<i>Purpose</i>
Rajasthan Canal	Pong Dam (Reas)	Rajasthan	Irrigation
Parambikulam Aliyar	Small rivers	Tamil Nadu & Kerala	Irrigation
Sarda Sahayak	Ghagra, Sarda, and Gomti	Uttar Pradesh	Irrigation
Ramganga	Ramganga	Uttar Pradesh	Irrigation
Farakka	Ganga	West Bengal	Irrigation
Mayurakshi	Mayurakshi	West Bengal	Irrigation
Kangsabati	Small rivers	West Bengal	Irrigation
Damodar valley		West Bengal and Bihar	Irrigation power gene- ration and flood cont- rol.
Thein Dam	Ravi	Punjab	Irrigation & power generation

3

World Geography

I. COUNTRIES OF THE WORLD

<i>Country</i>	<i>Where Situated</i>	<i>Capital</i>	<i>Currency</i>
Afghanistan	South Asia	Kabul	Afghani
Albania	Europe	Tirana	Lek
Algeria	Africa	Algiers	Dinar
Andorra	Europe	Andorra	Peseta (Spain)
Angola	Southern Africa	Luanda	Kwanza
Antigua	West Indies	St. John's	Dollar
Argentina	South America	Buenes Aires	Peso
Australia	—	Canberra	Dollar
Austria	Europe	Vienna	Schilling
The Bahamas	The caribbean	Nassau	Dollar
Bahrain	Persian Gulf	Manna	Dinar
Bangladesh	South Asia	Dacca	Taka
Barbados	The Caribbean	Bridgetown	Dollars
Belgium	Europe	Brussels	Franc
Belize	Central America	Belmopan	Dollar
Benin	Africa	Porto Novo	Franc
Bermuda	The Caribbean	Hamilton	Dollar
Bhutan	South Asia	Thimphu	Ngultrum
Bolivia	South America	La Paz	Peso
Botswana	Southern Africa	Gaborone	Pula
Brazil	South America	Brasillia	Cruzeiro
Brunei	East Indies	Bander Seri Begawan	Dollar

Bulgaria	Europe	Sofia	Lev
Burma	South Asia	Rangoon	Kyat
Burundi	Africa	Bujumbura	Franc
Cameroon	Africa	Yaounde	Franc
Canada	North America	Ottawa	Dollar
Cape Verde	Africa (Islands)	Praia	Escudo
Central African Republic	Africa	Bangui	Franc
Chad	Northern Africa	Fort-Lamy	Franc
Chile	South America	Santiago	Peso
China	Asia	Beijing	Yuan
Colombia	South America	Bogota	Peso
The Comoros	Africa (Islands)	Moroni	Franc
The Congo	Africa	Brazzaville	Franc
Costa Rica	Central America	San Jose	Colon
Cuba	West Indies	Havana	Peso
Cyprus	Mediterranean	Nicosia	Pound
Czechoslovakia	Europe	Prague	Koruna
Denmark	Scandinavia	Copenhagen	Krone
Djibouti	East Africa	Djibouti	Franc
Dominica	West Indies	Roseau	Dollar
Dominican Republic	West Indies	Santo Domingo	Peso
Ecuador	South America	Quito	Sucre
Egypt	North Africa	Cairo	Pound
El Salvador	Central America	San Salvador	Colon
Equatorial Guinea	Africa	Malabo	Ekuele
Ethiopia	Africa	Addis Ababa	Birr
Fiji	South Pacific	Suva	Dollar
Finland	Europe	Helsinki	Markka
France	Europe	Paris	Franc
Gabon	Africa	Libreville	Franc
Gambia	Africa	Bathurst	Dollar

Germany (East)	Europe	Berlin	Mark
Germany (West)	Europe	Bonn	Deutsche Mark
Ghana	Africa	Accra	Cedi
Greece	Balkans	Athens	Drachma
Grenada	West Indies	St. George's	Dollar
Guatemala	Central America	Guatemala City	Quetzal
Guinea	Africa	Conakry	Syli
Guinea-Bissau	Africa	Bissau	Escudo
Guyana	South America	George-town	Dollar
Haiti	West Indies	Port-au-prince	Gourde
Honduras	Central America	Tegucigalpa	Lempira
Hong Kong	South East Asia		
(not independent)	(Islands)	Victoria	Dollar
Hungary	Europe	Budapest	Forint
Iceland	Arctic Circle	Reykjavik	Krona
India	South Asia	Delhi	Rupee
Indonesia	South East Asia	Jakarta	Rupiah
Iran	Central Asia	Teheran	Rial
Iraq	West Asia	Baghdad	Dinar
Ireland	Europe (Island)	Dublin	Pound
Israel	West Asia	Jerusalem	Shekel
Italy	Europe	Rome	Lira
The Ivory Coast	Africa	Abidjan	Franc
Jamaica	West Indies	Kingston	Dollar
Japan	Far East Asia	Tokyo	Yen
Jordan	West Asia	Amman	Dinar
Kampuchea (Cambodia)	South East Asia	Phnom-Penh	Riel
Kenya	Africa	Nairobi	Shilling
Kiribati	Pacific (Islands)	Tarawa	Dallar
Korea (North)	Asia	Pyongyang	Uton
Korea (South)	Asia	Seoul	Won

Kuwait	Persian Gulf	Kuwait City	Dinar
Laos	South East Asia	Vientiane	Kip
Lebanon	West Asia	Beirut	Pound
Lesotho	South Africa	Maseru	Rand
Liberia	Africa	Monrovia	Dollar
Libya	North Africa	Tripoli	Dinar
Liechtenstein	Europe	Vaduz	Franken
Luxembourg	Europe	Luxembourg-vill	Franc
Malaysia	South East Asia	Kuala Lumpur	Ringgit
Malagasy (Madagascar)	Africa (Island)	Tananarive	Franc
Mali	Africa	Bamako	Franc
Malta	Mediterranean (Europe)	Valletta	Pound
Malawi	Africa	Licongwe	Kwacha.
Maldives	Indian Ocean	Male	Rupge
Mauritania	West Africa	Nouakchott	Ouguiya.
Mauritius	Indian Ocean	Port Louis	Rupce
Mexico	Central Africa	Mexico City	Pešo
Monaco	Europe	Monte Carlo	Franc
Mongolia	Asia	Ulan Bator	Tughrik
Morocco	West Africa	Rabat	Dirham
Mozambique	Southern Africa	Maputo	Escudo
Nambia	Southern Africa	Windhoek	Rand
Nauru	South Pacific (Island)	Nauru	Dollar
Nepal	South Asia	Kathmandu	Rupce
Netherlands	Europe	Amsterdam	Guilder
New Hebrides (Vanuatu)	South Pacific	Vila	Franc
New Zealand	Pacific	Wellington	Dollar
Nicaragua	Central America	Managua	Corboda.

Niger	Africa	Niamey	Franc
Nigeria	Africa	Lagos	Naira
Norway	Scandinavian	Oslo	Krone
Oman	Perisian Gulf	Muscat	Rial
Pakistan	South Asia	Islamabad	Rupee
Panama	Central America	Panama City	Balboa
Papua New Guinea	South Pacific	Poert Meresby	Kina
Paraguay	South America	Asuncion	Guarani
Peru	South America	Lima	Sol
Philippines	South East Asia	Manila	Peso
Poland	Europe	Warsaw	Zloty
Portugal	Europe	Lisbon	Escudo
Puerto Ric	Caribbean	San Juan	Dollar
Qatar	Persian Gulf	Doha	Riyal
Romania	Europe	Bucharest	Leu
Rwanda	Africa	Kigali	Franc
Samoa Western	South Pacific	Apia	Tala
San Marin	Europe	San Marino	Lira
Sao Tome & Principe	Africa (Islands)	Sao Tome	Dobra
Saudi Arabia	Asia	Riyadh	Riyal
Senegal	Africa	Dakar	Franc
Seychelles	Indian Ocean	Victoria	Rupee
Sierra Leone	Africa	FreeTown	Leone
Singapore	South East Asia	Singapore	Dollar
Solomon Islands (Kiribatu)	South Pacific	Honiara	Dollar
Somalia	East Africa	Mogadishu	Shilling
South Africa	Southern Africa	Cape Town	Rand
Spain	Europe	Madrid	Peseta
Sri Lanka	South Asia	Basseterre	Dollar
St. Kitts & Nevis	Caribbean	Colombo	Rupee
St. Lucia	West Indies	Castries	Dollar
St. Vincent & Grenadines	West Indies	Kingstown	Dollar
Sudan	North Africa	Khartoum	Pound
Surinam	South America	Paramaribo	Guilder

Bali : An Island of Indonesia known for Hindu monuments and temples, on which there are carvings depicting stories from the Ramayana and the Mahabharata.

Balkans : The politically important area of South-East Europe consisting of Yugoslavia, Bulgaria, Albania, Turkey and Greece.

Bastille : A jail in Paris which was destroyed by the Revolutionaries during the French Revolution (1789).

Berlin : West Berlin is under the occupation of the Western Powers and East Berlin is the capital of East Germany; the East German Government has constructed a 60 Km long wall along the East Berlin border.

Bethlehem : (Israel) the birthplace of Jesus Christ.

Borobudur : A place in Indonesia, known for Buddhist temples which were influenced by Indian architecture. They have been recently renovated under a UNESCO programme.

Brussels : Known for lace, carpets, silk and cotton cloth. Headquarters of NATO.

Buckingham Palace : London residence of the British monarch.

Cairo : The largest city in Africa and the Middle East, on the right bank of the Nile; an important international airport; important ancient Egyptian treasures are housed in the Museum of Antiquities.

Cape Kennedy : (formerly Cape Canaveral Florida) : Missile-launching centre : the Headquarters of National Aeronautics and Space Administration (NASA).

Chicago : (U.S.A.) The greatest grain and meat market in world; great rail way centre.

Corsica : An island in the Mediterranean, where Napoleon was born.

Cotopaxi : A volcanic mountain in the Andes without crater; the highest active volcano in the world.

Dardanelles : Strait between Europe and Turkey in the Black sea.

Eiffel Tower : Built in Paris. Now used as a wireless station.

Elysee Palace : Official residence of the French President.

Geneva : (Switzerland) Famous for watches ; Headquarters of the Red Cross Society and International Labour Organisation.

Gibraltar : A small island near Spain : It is a British base in the Mediterranean since 1763.

Greenwich : Situated on the Thames river near London (England). Well-known for its Astronomical Observatory.

Havana : Well-known for the manufacture of cigars.

Hollywood : (California) Film industry.

Istanbul : Seaport of Turkey ; stands on the Strait of Bosphorus ; formerly known as Constantinople.

Jerusalem ; Holy City of the Jews and Christians and Muslims.

Kimberley : (South Africa) The biggest diamond market in the world.

Lake Superior : The largest fresh water lake on the border of the U.S.A. and Canada.

Los Angeles : Hollywood ; Disneyland. 1984 Olympic games will be held here.

Louvre : (Paris). Now an art gallery.

Mecca : (Saudi Arabia) : The holiest city of Islam ; Prophet Mohammed was born here ; the Grand Mosque ; Kaaba.

Monte Carlo : Famous gambling centre on the Riviera in Monaco.

New York : (U.S.A.) The largest port of U.S.A. U.N. Headquarters.

Pisa : (Italy). Famous for Leaning Tower.

Pyramids of Egypt : The tombs of the former kings of Egypt constructed in the heart of Sahara desert.

Rome : The biggest church in the world, St Peter's ; famous for Roman ruins. Headquarters of FAO.

Taxila : Near Rawalpindi (Pakistan). Noted for ancient ruins of India. It was the seat of a University in Buddhist India.

Ulster : (North Ireland). Scene of bitter struggle between the Catholics and Protestants. Belfast is the capital of Ulster.

Washington : (U.S.A.) White House (the official residence of the U.S. President).

Wimbledon : Famous for its lawn tennis court.

III. FOREIGN TOWNS SITUATED ON RIVERS

<i>Town</i>	<i>River</i>
Baghdad	Tigris
Belgrade	Danube
Berlin	Spree
Budapest	Danube
Buenos Aires	La Plata
Cairo	Nile
Karachi	Sindh
Khartoum	Nile
Lahore	Ravi
Lisbon	Tagus
London	Thames
Madrid	Manzaneres
Moscow	Moskva
New York	Hudson
Ottawa	St. Lawrence
Paris	Seine
Rangoon	Irrawadi
Rome	Tiber
Shanghai	Yangtze-kiang
Sydney	Darling
Tokyo	Arakawa
Vienna	Danube
Warsaw	Vistula
Washington	Potomac

INDIAN ECONOMY

A study of the economic affairs of any country is an integral part of the General Knowledge relating to the country. This is the justification for inclusion of Indian Economy as a part of General Studies. A systematic study of Economics is of course out of question for a general candidate. However, without knowing the meanings of many terms and understanding these concepts and theories, it will not be possible for a person to study economic matters meaningfully. This is the reason why often economic terms are presented for the study of candidates. We have given below a large number of useful Economics and Commerce terms. In the remaining Chapters of this Part, a brief discussion about the basic aspects of the Indian Economy and the latest developments in this field are included. It has been our endeavour to reduce, to the minimum, the figures and data that have to be committed to memory. We hope that a candidate will be able to assimilate the matter that is written here and to make use of this for answering the questions on Economics and Indian economic affairs.

1

ECONOMICS & COMMERCE TERMINOLOGY

1. *Ad valorem* : (according to the value) : This kind of levy is generally made on items like stamp duties, excise, customs etc.
2. *Amalgamation* : Merger of two or more business concerns for their mutual benefit.
3. *Annuity* : A fixed amount of money to be paid to a person every year. It may be either because of some liability or as a result of a settlement; Payment will continue for definite period.
4. *Appreciation* : The increase in value of certain assets. Some assets like land, building etc become more valuable as time passes, i.e., they appreciate in value. The opposite phenomenon of depreciation.
5. *Articles of Association* : A set of international regulations for running a company or a concern. According to the Indian Companies Act, the articles of association must be registered when the company is formed.
6. *Assurance* : Payment of a premium at regular intervals so that at a particular time a fixed amount may become due for repayment to the person concerned. For e.g life assurance, endowment assurance.
7. *At Par* : The nominal value of a share. When a share is issued at par it is available for purchase at the value mentioned on the share, for e.g. Rs. 10 - share may be issued and may be available for purchase at Rs 10 - But the market value of the share may be either higher or lower.
8. *Attachment* : Prevention of disposal of specific goods or

money by a debtor through an order of the court, so that the money or property may be available in future for the settlement of the debts.

9. *Auction* : Offer of goods for sale in public. Generally the goods are to be sold on the spot to the highest bidder.
10. *Audit* : Inspection of the books of accounts of a concern (firm or company) by a person other than the one who prepares them. Audit of company accounts through qualified auditors is prescribed under law.
11. *Authorised Capital* : The amount of capital mentioned in the memorandum of association of a company. The company cannot issue shares for more than the authorised capital, unless certain formalities are fulfilled.
12. *Issued Capital* : The amount of capital actually issued by the company. The capital is normally issued by a company in the form of shares.
13. *Share Capital* : The total of shares issued are authorised to be issued by a company. The shares may be ordinary shares or preference shares.
14. *Paid up Capital* : That part of the capital of a company, which is called up and paid up.
15. *Bad Debts* : Debts which are known to be irrevocable and hence are treated as losses.
16. *Bailment* : Possession of goods belonging to another. It may voluntary as in the case of borrowing or involuntary as in the case of some article found in one's premises accidentally.
17. *Bank Advance* : A loan given by a bank against security. The interest rate is fixed according to the agreement between the parties.
18. *Bank Notes* : The currency notes which are in circulation. Originally these notes are considered as pieces of paper on which the Central Bank of the country stated that it owed the holder a particular sum of money.
19. *Balance Sheet* : A statement of accounts, generally prepared at the end of financial year. The statement shows the assets and liabilities of a concern separated.

tely.

20. *Bank Rate* : The official rate of interest charged by the Reserve Bank of India as the lender of the last resort. It is a rate at which the Reserve Bank of India discounts bills of exchange.
21. *Bankers Cheque* : A cheque drawn by one bank on another, either for clearing purposes or for transferring customers' money.
22. *Bankruptcy* : The situation in which a person (individual or concern) is unable to discharge his debt obligations. A court has to declare the person bankrupt according to the law. In the case of bankruptcy the creditors get only proportionate repayment of the debts due to them.
23. *Bear and Bull* : Terms used in the stock exchange to refer to individuals or conditions. An individual who sells shares in the belief that prices will fall later is called a bear. The very act of selling shares induces the public to believe that the prices are to crash and thereby causes a fall in the prices of shares. An individual who buys shares in the hope that the shares will appreciate quickly is called a Bull. When the buying spree goes on, the public feel that the prices are likely to rise further. Thus artificial demand is created leading to appreciation in the prices of shares. The condition of a stock exchange is described either as Bearish or as Bullish depending on the situation described above.
24. *Bill of Exchange* : An unconditional order in writing addressed by one person to another requiring the addressee to pay on demand or at a fixed future time a certain sum of money to the order of the specified person or to the bearer. Bill of exchange is used only for money payment. It is considered a negotiable instrument.
25. *Blank Cheque* : A cheque in which no sum of money is written. The holder is expected to fill in the amount himself.
26. *Bond* : Another name for security, particularly the securities issued by the Government.
27. *Bonus Issue* : An issue of shares to existing share

holders in a company made possible by the capitalisation of reserves. No payment is necessary in this case.

28. *Boom* : According to the theory of trade cycle the highest point beyond which upward movement is not possible. At this condition prices and employment are at the maximum.
29. *Bubble Company* : A company that has never done any real business or honest trade. A company formed with an intention of defrauding the public.
30. *Bullion* : Gold and Silver of a recognised degree of purity. Generally it is in the form of gold or silver bars.
31. *Call Money* : Also known as 'money at call and at short notice'. In the balance sheet of a bank, money at call is the money that must be repaid on demand. Money at short notice is the money borrowed for a short duration, generally 24 hours at a low rate of interest. When the money at short notice is available in plenty it is described as easy money. When it is not so available it is called tight money.
32. *Capital Issue* : The issue of shares in a company by issuing the prospectus. It may also be done by means of introduction, offer for sale or tender.
33. *Rights Issue* : An invitation to existing share holders buy additional shares in the company. The price for the share holders will be normally lower than the prevailing prices in the open market. The share-holder may sell this right to a third party thus making a profit for himself.
34. *Carat* : The unit used for measuring the refinement of gold. Pure gold is assigned 24 carat. 18 carat gold will have 18 parts gold and 6 parts alloy.
35. *Cartel* : The formation of a monopoly type group by different companies in one industry in order to avoid competition.
36. *Cash Discount* : The discount given by creditor on an account paid before the due date. This is done to encourage quick payment.

37. *Caveat Emptor* : A Latin legal term meaning 'let the buyer beware'. This maxim expects a buyer to use commonsense in choosing the right type of goods.
38. *Cheap Money* : Money is said to be cheap when credit is easily available and interest rates are low.
39. *Cheque* : A bill of exchange drawn on a banker payable on demand. The cheque may be opened or crossed. A cross cheque can only be encashed through a bank account.
40. *Clearing House* : The place where the different banks in a city or town come together to clear the cheques drawn on various banks and their branches.
41. *Co-lateral Agreement* : An agreement or contract running parallel to an existing agreement.
42. *Co-lateral Security* : The additional security given for a loan over and above the assets on which the loan is charged.
43. *Common law* : The law of the land which is crystallised into definite rules from the ancient times. Precedent is the main criterion for common law.
44. *Company* : A corporate body which is established by individuals under the Indian Companies Act. In the case of an unlimited company, all members are liable for debts. In the case of a limited company, the liability of each member is limited to his share in the company. A private company is one which restricts the right to transfer its shares and as not more than 50 members and cannot invite the public to subscribe for shares. All other companies are public companies. A public company may issue shares and the shareholder has the right to transfer the shares.
45. *Con-man*: Abbreviation for 'confidence-trick man'. Applies to a person who wants to make wealth by fraudulent means after creating unreasonable confidence in his honesty and integrity.
46. *Corporation Tax* : A tax levied on the profits of companies. It is in lieu of income tax and profit tax.
47. *Cost Accountant*: A person employed in an industry to provide a continuous check and control over all forms

of expenditure. The method which he employs is known as costing.

48. *Current Account* : A term used in book keeping with reference to the proprietor's personal accounts. The other accounts. is capital account.
49. *Dear Money* : The opposite of cheap money.
50. *Debentures* : A document setting out the terms of conditions of a loan. The debenture holders are to be paid a fixed annual rate of interest. The debenture holders have a first claim on the assets of the company. Debentures are different from shares.
51. *Debit* : In double entry book keeping, this term is used for entry on the left hand side of an account.
52. *Credit* : Is an entry made on the right hand side on an account.
53. *Demurrage* : The penalty payment to be made for delaying a ship or completion of work.
54. *Deposit* : An amount of money paid to a vendor as a part of the purchase money and to secure the same. The same term is used for the amounts deposited in the bank by account holders.
55. *Dividend* : A share of profits paid to share holder of a company Preference dividends have precedence over ordinary dividends. It is not compulsory for a company to pay dividends.
56. *Double Entry Book Keeping* : A form of accounting by all business transactions are entered, each transaction being entered on both sides. The book in which all accounts are kept is known as the ledger.
57. *Dumping* : A term used in international trade for unloading large quantities of a commodity produced in one country into another at low price. Certain countries resort to dumping to kill competition.
58. *Elasticity of Demand* : The extent of change in the demand for commodities according to the changes in prices.
59. *Embargo* : Prohibition of entry of goods from certain countries into a particular country. The embargo is generally imposed by a country to show its disapproval

to policies or constrained relations with another country.

60. *Equity* : That part of the law which deals with matters which are not in the common law of land or statute law.
61. *Face Value* : The value stated on the face of goods. This is to be differentiated from its market rate.
62. *Fiduciary Issue* : That part of the bank note issue of the Reserve Bank of India, that is backed by the government and the other securities and not by gold. The fiduciary issue is regulated by Parliament by law.
63. *Firm* : A Partnership concern.
64. *Free Port* : A port in which no customs duties are levied for imports or exports.
65. *Freight* : The amount of payment made by a person chartering a ship or rail wagon for transport of his goods.
66. *General Agreement of Tariffs and Trade (GATT)*: An international agreement signed by many countries in 1947 to remove barriers to trade through tariff concession, revision and abolition, on a multi lateral basis. The most-favour-nation treatment is to be extended through all members of the G.A.T.T.
67. *Gilt-edged Securities*: Securities or investments in which the risk is minimum i.e., the repayment of capital interest are certain. Generally applied to government securities.
68. *Goodwill* : The goodwill earned by a concern because of his proper working and fair transactions established over a long period. When a concern changes hands, payment is made for transfer of goodwill.
69. *Gratuity* : A payment made a person when specific legal obligations for the service rendered by the person
70. *High Seas* : That part of the seas or oceans which are outside the territorial waters or exclusive economic zone of different countries.
71. *Hire purchase* : The scheme which facilitates purchase of goods through hire. Since the purchaser is unable to pay the seller price in lumpsum, he is allowed to hire

the goods and to pay the sale price along with rent in instalments.

72. *Holding Company* : A company may be a subsidiary of another company if the other company controls the composition of its Board of Directors or if the other company holds more than half of its equity share capital. The parent company is known as the holding company.
73. *Hypothecation* : Similar to markets. The loanee hypothecates the goods borrowed from a bank or lender as the security for his repayment.
74. *I.O.U.* : The notation for 'I owe you'. This is a note (Promissory note) indicating the debt held by one party to another. It cannot be used as a negotiable instrument.
75. *Indemnity* : An agreement whereby one person agrees to make good any loss suffered by a party to a contract in which he is not himself personally involved.
76. *Insolvency* : A person or organisation is insolvent if he or it is unable to pay debts which have become due. Insolvency is not the same as bankruptcy.
77. *Insurance* : The payment of a sum of money by one person to another on the understanding that in specific circumstances the second person will make good any loss suffered by the first person, e.g. fire insurance marine insurance etc. The insured has to pay the premium to the insurer annually or periodically.

2

INDIAN ECONOMY

Development : Indian economy, as in the case of most Third World countries, is under-developed and developing. The problems of under-development are low income, high density of population, population explosion and lack of capital. Indian economy is developing since there has been rapid progress in control of population, quantum of production, creation of infra-structural facilities and in the rate of investment.

The Structure of Indian Economy : Indian economy is rural-oriented and agriculture-based. It operates within the framework of democratic socialism and mixed economy. Planning is an important aspect of the structure of Indian economy since Independence.

Planning : Is defined as a 'continuous movements towards desired goal.' (Nehru), The Indian National Congress set up a national planning committee in 1938. In 1955 the ruling party, the Indian National Congress defined 'socialistic pattern of society' as the goal. The Planning Commission was set up in March 1950 and the five-year plans were inaugurated in 1951. There have been six five-year plans so far : First plan (1951-56); Second plan (1956-61); Third plan (1961-66) Fourth plan (1969-74); Fifth plan (1974-78) and Sixth plan (1980-85). In addition there are Annual plans which are incorporated into the budget and which conform to the five-year plans. The general objectives of the plans are (i) high rate of growth (5% for national income and 3% for per capita income); (ii) social justice; (iii) self-reliance; (iv) modernisation. The policy framework for the plans emphasizes 'growth with stability', removal of regional imbalance, strengthening of public distribution system etc.

The specific objectives of the successive plans are the following :

First Plan : Correcting the dis-equilibrium in the post-war economy and initiating a process of allround development ;

Second Plan : Emphasis on heavy industries ;

Third Plan : Emphasis on self-reliance, specially self-sufficiency in food production ;

Forth Plan : To reduce fluctuations in agricultural production, generating employment opportunities and improving the conditions of weaker sections ;

Fifth Plan : Removal of poverty and stabilisation of economy ;

Sixth Plan : Higher rate of investment and growth and improvement in the conditions of the people below poverty line. The minimum needs programme has been a part of the five-year plans since the fifth plan. In 1982 the revised 20-point programme was announced and later was incorporated as part of the Sixth plan.

The salient features of the sixth plan : The total financial outlay is Rs. 1,72,210 crores. The public sector outlay is Rs. 97,500 crores. The mobilisation of resources for the sixth plan is as follows : domestic budgetary resources (50%) ; domestic borrowing (33%) ; external assistance and borrowing including depletion of foreign exchange reserves (11%) and deficit financing (5%). The target for annual rate of growth in GDP is 5.2%, and in the rate of growth of per capita income is 3.3%.

In August 1983 a review of the sixth plan was held. Because of inflation the real investment has not been up to the target. So the government has decided to raise the monetary target to Rs. 1,10,000 crores.

Agricultural Development: The share of agriculture to national income is around 45%. Foodgrains production has increased from 51 million tonnes in 1950-51 to 142 million tonnes now. There has been corresponding increase in the pro-

tion of other agricultural commodities also. The average rate of growth of agricultural production is 3%. Pulses production which remained stagnant at around 11 million tonnes is now been raised to 13 million tonnes. Major land reform measures have been initiated since Independence. They are abolition of Zamindari rights, ceiling on agricultural land holdings, tenancy reforms, distribution of surplus land and government land to landless workers and marginal farmers, consolidation of holdings and conferment of ownership rights on homestead tenants. The tenancy reforms are conferment of ownership on the tenants, protection of tenancy and fixation of fair rent. A number of development schemes have been taken up for promoting agriculture.

Industrial Development: Indian industry has increased and diversified since Independence. Industrial growth is normally measured in terms of index number of industrial production with base year 1970. The weightages given to the three broad categories of industries are : manufacturing (81%) : mining (10%) and electricity (9%). The industrial policy of Central Government is governed by the Industrial Policy Resolution of 1956, which classified industries into 17 Schedule A industries which were to be in the state sector, 12 Schedule B industries which were to be progressively nationalised and the residual industries in Schedule C which were to be subjected to the government control according to the Industries (Development and Regulation Act, 1951). The government periodically announces new industrial policies. The last major industrial policy was announced in 1980.

Trade and Aid : Indian trade has expanded both in volume and value, diversified from a few items to a large number of items and changed substantially in the direction of trade, since Independence. Indian exports have been having a sluggish growth for the last few years and now stand around Rs. 9000 crores. Imports have always been much more than exports except for the year 1976-77. However, the import of oil has come down since 1981-82. The trade gap widened to around Rs. 5000 crores during the last few years and is now under decline. India's foreign exchange reserves were around

1975-76 impressive reserves were built up, reaching the peak of Rs. 5,220 crores in 1978-79. Since then the reserves have come down to Rs. 5,164 crores in 1979-80; to Rs. 4,822 crores in 1980-81; to Rs. 3,354 crores in 1981-82: but have started picking up since 1982-83.

Price Situation : The index number of wholesale prices arisings weightages as follows : primary articles (42%), fuel and power (8%), manufactured products (50%). The wholesale price index has the base year 1970-71 but the consumer price index is based on 1960 and does not faithfully reflect the changes in the wholesale price index. So the government has decided to change the later index with 1980 or 1982 as the base year. For the last few years the Central Government has been operating the system of support prices for agricultural commodities. Before the sowing season starts, generally the government prices are announced for cerials, pulses and some other agricultural commodities.

3

INDIAN ECONOMIC AFFAIRS

India's foreign debts stood at Rs. 18,231 crores at the end of September 1983.

Sixth Plan Review : Speaking in the Parliament the Union Planning Minister has pointed out in December 1983 that the target of 5.2% growth rate for national income is likely to be achieved. Excepting in a few sectors, the physical targets have not been scaled down. Regarding foodgrains, the targets were fixed at 149-154 million tonnes, whereas the mid-term assessment pointed to 146-148 million tonnes. He felt that foodgrain production would easily rise to 149 million tonnes by the end of the Sixth Plan period, as targetted. Oil production is expected to exceed 30 million tonnes, much beyond the target. Only in additional power generating capacity and railway freight-earning traffic there would be shortfalls.

There has been a massive increase in prices throughout 1983-84. Despite the recovery of the Indian economy in 1983-84 with substantial increase in the production of foodgrains and reasonably good performance of the industrial sector, there is no explanation for the continuing increase in the wholesale prices. Although the official rate of inflation (based on wholesale prices) may be only around 10%, the increase in consumer prices has been quite substantial and much higher.

The per capita income in real terms (at constant price) suffered a decline in 1982-83 from Rs. 715 to Rs. 712. During the same period the national income had an increase of only 1.7% as against 5% during the previous year. In 1982-83 there was a sharp decline in the

Annual Plan : The total outlay of 1984-85 Annual Plan is Rs. 30,132 crore as against Rs. 25,480 crore last year. The increase in the Central Plan outlay is very substantial compared to the State Plan outlays. The budget envisages the central assistance of Rs. 5,050 crores to the State Plans.

Salient Features :

- (i) The budget provides substantial tax relief in income tax, corporation tax and excise duties and depends wholly on auxiliary customs duties and certain excise levies for the additional revenue. The income tax rates have been reduced marginally for all slabs. Substantial Excise duty reduction is there in some consumer items such as Kandasari Sugar, cloth, paper, table fans, fabrics, stainless steels etc. Certain tariff readjustment have been carried out aiming at better production.
 - (ii) The break up of revenue (by source) is : 17% customs; 15% excise; 15% non-tax revenue; 6% corporation tax; 4% external assistance; 1% income tax; 20% market loans and other savings schemes etc. The deficit will be 4%.
 - (iii) On the Expenditure side, the increase in defence expenditure to Rs. 6,800 crores is worth noting. The allocations for different categories of expenditure are 39% Plan; 21% other development expenditure; 16% defence; 13% interest payment; 4% transfer to States and Union Territories etc.
 - (iv) A major deposit mobilisation scheme announced in the Budget is the National Deposit Scheme which is expected to mobilise Rs. 5,000 crores for investment in the public sector. The scheme envisages issuance of certificates with a maturity period of four years. The additional benefit given to depositors is that the certificates can be encashed before maturity at reduced rates of interest.
8. The state of Indian economy is reflected in the Budget Economic Survey for 1983-84. It expects 6 to 7% real growth in gross

The foodgrains output is expected to be 142 million tonnes, representing a growth of 9%. The growth rate in industry may be around 4%. The Sixth Plan targets of 5.2% for G.N.P. and 3.3% for per capita income are likely to be realized if the performance of the economy during 1983-84 is normal. There has been a substantial improvement in the foreign exchange reserves; so, the Union Government has voluntarily foregone the remaining part of the I.M.F. Extended Fund Facility. The Indian Government has so far drawn only 39 billion SDRs. The trade gap for 1983-84 is likely to decline below Rs. 5,000 crores from Rs. 5,526 crores for the earlier year. Thus there is better performance on the foreign exchange front. It has been pointed out that the domestic oil production has substantially increased from 16 million tonnes to 21 million tonnes.

9. The Central Government Public Sector undertakings have made a record post-tax profit of Rs. 617 crores during 1982-83. This is higher than Rs. 444 crores in 1981-82. The total investment of the Central Government in 205 public sector undertakings of the Central Government is Rs. 30,039 crores as on 31 March 1983. The public sector undertakings that have been making profit are O.N.G.C. Oil India Limited, Indian Oil Corporation, State Trading Corporation etc. The loss-incurring public sector undertakings are S.A.I.L., Delhi Transport Corporation and other Government Companies dealing with iron and steel, fertilizers, coal etc.
10. The Central Government has constituted an expert committee headed by to Mr. L.K. Jha into the question of changing the period of the financial year. The desirability of changing the financial year from April-March to November-October may be considered by the Committee.

PART VI
CURRENT AFFAIRS

CURRENT AFFAIRS

Current Affairs is an important region of general knowledge and is essentially required for any well-informed and well-educated person. Obviously the scope of Current Affairs is very vast. There are numerous happenings around the world relating to all aspects of General Studies and different branches of knowledge. No doubt, the political developments inside and outside the country are important; but nowadays much attention is paid to the economic, scientific and other developments. Although the sources of knowledge of current affairs are many, the real problem faced by the Competitive Examination candidates is that they will have to sift the relevant matter out of the mass of information that pours daily into the news sources from all directions. It is in this context that we have chosen the most relevant matter that is immediately necessary for the different competitive examinations. Bulk of the objective-type questions in Current Affairs are devised in a very simple manner with emphasis only on knowledge. Therefore a systematic study of the important issues is not of immediate use in answering objective-type questions on current affairs. However, it is expected that the candidates should be interested in having the minimum necessary background with regard to the important happenings.

Generally the period covered by the questions in Current Affairs is one year before the date of the Examination. This requires the candidate to look back, to identify all the important happenings in the days and months much before the examinations. Occasionally they have put questions, on matters which happened a few years back. So a candidate should not be attached too much importance to the day-to-day developments with regard to major issues, but should have an eye for the examination-relevant small and big matters. A substantial number of examination questions in recent times have been put on the Award and Sports matters. These have been covered in separate Chapters in this part.

1

CURRENT AFFAIRS IN BRIEF

1. *The Commonwealth Summit:* The Commonwealth Heads of Government Meeting was held at New Delhi from 23 to 29, November 1983. Of the 48 total number of members, 42 attended the meeting; 33 of them were represented by the Prime Ministers or Presidents. The Summit was inaugurated by the British Queen Elizabeth II as the Head of the Commonwealth. Two new members-Antigua & Barbuda and St. Kitts & Nevis-and the new special member, Maldives, were welcomed by the summit leaders. From Goa, the weekend retreat, the leaders issued the Goa Declaration. At the end of the Summit meeting, the final communique was issued. The Summit leaders decided to constitute a 5-member group on Cyprus in order to find ways of annulling the unilateral Declaration of Independence by the Turkish-Cypriot Assembly. The members of the group are Australia, Guyana, India, Nigeria and Zambia. The Commonwealth Summit also constituted the 9-member consultative group to report on solutions of world economic issues. The Summit decided to set up a commonwealth higher education unit to widen educational opportunities for the citizens of the member-countries. The Secretary-General of the Commonwealth, Mr. Shridath Ramphal was offered a third term to commence from 1985. The next Commonwealth Heads of Governments Conference will be held in Bahamas in 1985. The question of readmission of Pakistan to the Commonwealth was not raised in the Summit conference.

The present 44 full members of the Commonwealth are: Antigua & Barbuda, Australia, the Bahamas,

Bangladesh, Barbados, Belize, Botswana, Britain, Canada, Cyprus, Dominica, Fiji, Gambia, Ghana, Grenada, Guyana, India, Jamaica, Kenya, Kiribati, Lesotho, Malawi, Malaysia, Malta, Mauritius, New Zealand, Nigeria, Papua New Guinea, Saint Christopher and Nevis, Saint Lucia, Seychelles, Sierra Leone, Singapore, Solomon Islands, Sri Lanka, Swaziland, Tanzania, Tonga, Trinidad and Tobago, Uganda, Vanuatu, Western Samoa, Zambia and Zimbabwe. In addition, Nauru, St. Vincent and Grenadines, Tuvalu and Maldives are special members which take part in all commonwealth activities except the summit meetings. Thus the total Commonwealth membership to date is 48. Brunei which became independent on 1 January 1984, had already been participating in some of the Commonwealth meetings even before independence. It may be noted that there is no constitution or charter for the Commonwealth. It is a free association of members with no treaty obligations of any kind.

When the British Commonwealth started there were only five members—Britain, Canada, Australia, New Zealand and South Africa. When India became independent it decided to become a member of the Commonwealth and so from 1984 the adjective 'British' was dropped and the condition of allegiance to the British Monarch also was given up. As the Colonies of Britain became independent one after another, they became members of the Commonwealth. South Africa withdrew from the Commonwealth in 1961 because of the criticism of other members regarding its apartheid policy. In 1972 Pakistan withdrew from the organisation since some of the members had recognised Bangladesh. Nauru is the smallest country in the Commonwealth. The last country to become a member of the Commonwealth is St. Kitts & Nevis which became independent in September 1983. The Commonwealth Secretariat was established in 1965 and has had, so far, only two Secretary-Generals—Mr. Arnold Smith (Canada) in 1965-1975 and Mr. Shridath Ramphal Since 1975.

2. *Situation in Punjab:* Following increase in extremist

activities, Punjab was placed under President's rule on 6 October 1983. Immediately a new Governor was appointed. Mr. B.D. Pande, the Governor of West Bengal was transferred to Punjab. The next day Punjab and Chandigarh were declared as 'disturbed areas'. The administration and the police got sweeping powers including the right to detain and search persons without warrant. Offer of the Prime Minister to refer all issues—river waters and territorial—to tribunals was outright rejected by the Akali Dal President Sant Longowal. Even during the President's rule violence by extremists has continued unabated. The *Dhiliwan* massacre which prompted the Government to impose President's rule was shortly followed by another massacre at Tarn Taran. In spite of the militant utterances of Sant Bhindranwale, the Government has not arrested him since he is living within the Golden Temple complex.

The situation in Punjab has continued to deteriorate, particularly after the Akali Dal issued one month's ultimatum to the Union Government on 27 January 1984 to accept its demand for amending Article 25 of the Constitution. The Government was initially equivocal about this demand, but announced later that it would set up a Committee to consider the implications of deleting Article 25. On 4 March 1984 the Punjab Government declared three districts of Punjab as 'dangerously disturbed areas'. This has enabled the Central Reserve Police, the Border Security Force and other police, para-military and miscellaneous forces to tackle effectively the law and order situation. Besides, the Government has banned the All India Sikh Student Federation whose leaders had openly advocated violence and secession. After a month (3 April) the Punjab Government declared the entire state as 'dangerously disturbed area' and assumed sweeping powers under Armed Forces (Punjab and Chandigarh) Special Powers Act, 1983 for three months. In addition the Central Government issued an ordinance amending the provisions of the National Security Act, 1980 making the conditions of preventive detention much more stringent.

According to this ordinance, a person can be detained for six months without reference to the Advisory Board. However, there has been practically no decrease in the extremist violence since then. On 1 May, 1984, the Central Government issued an order extending the ban on Dal Khalsa and the National Council of Khalistan by another two years. These extremist associations were originally banned on 1 May 1982.

3. The First Foreign Ministers meeting of the South Asian Regional Cooperation (SARC) was held at New Delhi in August 1983. Since the spade-work for the conference had been done for nearly two years, the two-day conference was an extremely smooth affair. The foreign ministers of the seven South Asian countries—India, Pakistan, Bangladesh, Nepal, Bhutan, Sri Lanka and Maldives—issued a declaration at the end of the conference. The declaration outlines the rationale for SARC, its objectives and principles. The foreign ministers also signed a document on the Integrated Programme of Action (IPA) outlining schemes of cooperation in agriculture, rural development, telecommunication, postal service, meteorology, public health and population studies, science and technology, sports, arts and culture. The foreign ministers conference is likely to be held once in a year.
4. *Sri Lanka Ethnic Violence*: The serious communal riots which broke out in Sri Lanka in July 1983 show the intensity of the ethnic problem in that country. Hundreds of innocent Tamils were massacred and more than 50 persons in the maximum security prison at Welikade in Colombo were killed by the Singalese mobs which went out of control for nearly three days 25 to 27 July 1983. The Sri Lanka Government restored order gradually and effected changes in the Constitution to deprive advocates of separatism of their civil rights. The Tamil United Liberation Front, whose General-Secretary is Mr. Amirthalingam, has been seeking a solution to the Tamil problem through the mediation of the Indian Government. However, there are other liberation organisations including the Liberation Tigers who

are fighting for the independence of the Tamil-speaking Sri Lankan Provinces including Jaffna through the mediation of India. A Round Table Conference was held at Colombo in February and March 1984. However, the results were unsatisfactory and the conference was abruptly adjourned without date. There have been renewed attacks against the Tamils during the last few months. The solution to the problem is not yet in sight.

5. India has become one of the five non-permanent members of the United Nations Security Council, elected for the period 1984-85. The others which were elected along with India are Egypt, Ukraine, Upper Volta and Peru. There was no contest for the seat in which India replaced Jordan. The other five non-permanent members who will continue for the year 1984 are Pakistan, Malta, Netherlands, Nicaragua and Zimbabwe.
6. The Turkish Cypriots declared Unilateral Independence in Nov. 1983. Mr. Rauf Denktash, the de facto President of the Turkish Republic of Northern Cyprus read out the declaration in the Assembly. It may be noted that following the Turkish invasion of Cyprus in 1974, Denktash had managed to carve out the northern part of Cyprus as a virtually independent territory. The United Nations Security Council condemned the UDI and called upon Turkish Cypriot leaders to annul the Unilateral Declaration.
7. The USA which had sold about 100 Harpoon missiles to Pakistan, recently decided to increase this quantity and to supply other sophisticated weapons. This has caused concern to India because of the security implications of the United States move. Harpoon is a new generation missile which is difficult to detect. It may be remembered that USA has already supplied forty F-16 fighter-bombers to Pakistan.
8. The Vishwa Hindu Parishad organised recently a new type of pilgrimage styled 'Ekamata Yagna' (Sacrifice for unity of the soul). There were three major processions covering different parts of the country in November of 1983.
9. Lt. Gen. H.M. Ershad who seized power in a bloodless

coup in March 1982 assumed presidency of Bangladesh recently after Mr. A. Chowdury resigned without reason. The opposition to the martial law regime comes from two political fronts—one headed by Begum Hazina Wazed, the daughter of Sheikh Mujibur Rahman and Begum Khaleda Zia, the widow of Zia-ur-Rahman. Gen. Ershad has fixed the presidential elections for 24 May 1984. He hopes to follow it up with the elections to the Parliament. However, he is determined not to allow free functioning of political parties nor to lift the martial law.

10. The Strategic Arms Limitation Talks between USA and USSR broke down on 23 November 1983 when the Soviet delegates walked out of the talks. On that date Pershing II and Cruise Missiles arrived in West Germany from USA. It may be noted that the USA is going ahead with the programme of installing 108 Pershing and 464 Cruise missiles in West Europe by 1986. West Germany is to instal the maximum number of missiles, followed by Britain, France, Italy, and Turkey. These missiles will be targetted on Soviet Europe and can reach targets in 5 to 6 minutes. The Soviet leaders have announced that they will not resume negotiations until the United States' medium-range nuclear missiles deployment scheme is abandoned.
11. The controversy between the Antarctica Treaty Powers and non-Treaty countries on the use and study of the Antarctica was finally resolved in December 1983. For the first time the matter was raised in the United Nation General Assembly and countries like Malaysia insisted that the Treaty was not binding on the other countries of the world. The compromise formula is for appointing a United Nation study on the Southern Continent.
12. In the last meeting of the Antarctica Club which took place at Bonn in August 1983, India was admitted as consultative member. The Antarctica Treaty of 1959 which came into force in 1961 was originally signed by 12 countries and is to be in force for a period of 30 years. Some of the original signatories have made territorial claims on parts of the Antarctica. But the treaty

does not settle the existing territorial claims and rules out the extension of such claims to other parts of Antarctica. 14 countries were later admitted as ordinary members without consultative status. Of these, Poland and West Germany were later conferred the status of consultative members. Since India had undertaken two expeditions to the Antarctica till the beginning of 1983, its claim to become a consultative member was quite substantial. Now that India has become a member of the Treaty, India can make use of the research done by the other member-countries.

13. The Parliament has passed the Immigration Act, 1983. The Act seeks to regulate the recruitment of all types of Indian workers for foreign employment. All recruiting agencies are to deposit security money with the Central Government and have to get a licence which will be valid for a maximum period of three years. It is expected that unscrupulous exploitation of Indian workers by bogus and dishonest recruiting agencies will be curbed by this step.
14. A United Nations survey has revealed that during the last few years India has been the largest donor of doctors and nurses to other countries of the world. Between 1977 and 1979 more than 50,000 scientists and engineers had migrated from India. Recently the Central Government has announced a scheme to attract the best scientists who had gone abroad and now wants them to come back with the latest technology.
15. In the recent parliamentary (Diet) elections in Japan the Liberal Democratic Party retained its majority only with the support of some independents. It lost 36 seats and made Prime Minister Y. Nakasone even more dependent on the different factions within the ruling party and on the independents. The next largest party in Japan is the Japan Socialist Party.
16. The interim report of the 8th finance commission headed by Mr. Y.B. Chavan was submitted to the parliament in December 1983. Since the commission had not finalised its proposals, it recommended the continuance of the existing scheme of distribution for the fifth

year 1984-85. It also indicated the amounts of grant-in-aid to be given to different states for the current financial year. The final report of the Commission has been submitted on 30 April 1984.

17. India's Third Expedition to Antartica, headed by Dr. H.K. Gupta reached the icy continent on 27 December 1983. The team this time was the biggest (83 members) including two lady scientists. They set up 'Dakshin Gangotri', a permanent research station in the Antartica and conducted a series of experiments. The permanent station is provided with heating and water supply system. The third Indian Antarctic expedition returned to Marmugao port on 29th March 1984. They left behind a twelve member team to remain in the Antartica during this winter. The ship in which they travelled is named 'Finno Polaris'. The main team stayed on the icy continent for sixty-six days.
18. The 15th International Genetic conference was held at New Delhi in December 1983. Dr. M.S. Swaminathan delivered the presidential address in which he talked about the prospects of producing bugs for industrial use and of multiple mutation for creating new strains of plants. He highlighted the threat posed by de-forestation and mono-culture. Although a national Bio-Technology Board has been set up in India, very little has been done to promote frontier research in bio-technology. Eminent scientists including Dr. Jonas Salk, the discoverer of anti-polio vaccine attended the Conference.
19. In a major coup in Nigeria, President Shehu Shagari was removed from presidentship by the military General, Mohammed Buhari. The military ruler quoted rampant corruption and financial mismanagement as the reasons for toppling the democratic government. It may be remembered that Nigeria was restored to democracy only in 1979 after 13 years of military rule. In the recent general elections, Mr. Shagari managed to retain power in the world's fourth largest democracy. However, the financial condition of Nigeria has fast deteriorated during the last two years following the oil glut.

20. Southern African Development Coordination Conference (SADCC) which was set up in 1980 seems to be functioning well. It is meant to promote the economic development of the member-countries and to reduce their economic dependence on South Africa. The members are Mozambique, Zimbabwe, Zambia, Tanzania, Botswana, Angola, Swaziland, Lesotho and Malawi. Its secretariat is located at Botswana.
21. The first batch of three British sea Harriers have been formally inducted into India's Naval fleet in December 1983. Harriers are multi-role fighter aircrafts capable of carrying a wide range of armament loads including missiles. They have been bought from the British Aerospace which are also building Jaguars. They will be used in India's aircraft-carrier INS Vikrant.
22. Indo-Pakistan Joint Commission : The meeting of the sub commissions on cooperation in the fields of travel, tourism, information, education, culture and sports was held in January 1984. They have decided to promote tourism and exchange visits of artists and writers and to issue double entry transit visas to persons passing through either country. They also agreed to increase exchanges in sports.
23. Mr. Yuri Andropov, the Soviet President and General Secretary of the Communist Party of Soviet Union died on 9 February 1984. He had succeeded Leonid Brezhnev in October 1982, and was long suffering from serious illness. During his period the East-West relations deteriorated. Mr. Konstantin Chernenko succeeded Mr. Andropov, as the General Secretary of the Communist Party. Later (March 1984) he was elected as the President of USSR. Chernenko, 72, is the oldest person to have been elected as the supreme leader of the Soviet Union. Mr. Nikolai Tikhonov continues to be the Prime Minister.
24. The fourth summit meeting of Islamic Conference Organisation was held at Casablanca in Morocco in January 1984. The main decision of the summit relates to inviting Egypt to rejoin the Organisation. It may be noted that, following Egypt's signing the Camp David Agree-

ment with Israel, Egypt had been expelled from the Organisation. The Casablanca conference also adopted a new 'peace plan' which is basically the same as the Fez Plan of 1982.

25. In December 1983 the President has assented to the Assam Bill titled 'Illegal migrants' (Determination by Tribunals) Bill, 1983. The Bill seeks to provide for the detention and deportation of illegal migrants after 1971. Tribunals are to be set up for this purpose.
26. During the visit of the Soviet Deputy Prime Minister Mr. I.V. Arkhipov in December 1983, the problems relating to trade between India and the Soviet Union were sorted out. The trade turnover envisaged for 1984 is Rs, 3,840 crores. India will export new items such sugar, oilcake, new machinery, resins and will buy the new items—aluminium and cement. Soviet Union is to supply 3.6 million tonnes of crude during 1984. India's main exports to Soviet Union have been knitwear, pepper and mica.
27. The United States has decided to withdraw from the UNESCO from 1985. The decision was announced in December 1983. The three important reasons quoted by it are ; Politicisation of every subject before the organisation; display of open hostility to the institutions of a free society such as free market and free press: too much of budgetary extension from year to year. All these charges against the UNESCO have been refuted by its Director-General Dr. A.M. M'Bow.
28. Mr. Seewoosagur Ramgoolam was once the Prime Minister of Mauritius, heading the Mauritian Liberal Party has been appointed as the Governor-General of Mauritius in December, 1983. Although his party was defeated in the general elections last year, he had an understanding with the Prime Minister, Aneerooth Jugnath.
29. Brunei : The South-East Asian Sultanate in the East Indies became fully independent on 1 January 1984. Earlier it was under the British rule for nearly a century. It is one of the richest nations in Asia because of oil production. Its capital is Bandar Seri Begawan.

30. The first conference of the Asian Forum of Parliamentarians on Population and Development was held in New Delhi in February 1984. The chairman of the forum Mr. Takashi Sato presided. The conference decided that the developing countries should set the target of 1% population growth rate by 2000 A.D. 29 countries from the Asian and the Pacific took part in the conference.
31. Charles Musk Correa an architect of Bombay has been recognised as the best international architect for 1984 by the Royal Institute of British Architects. Lutyens who designed New Delhi and Le Corbusier the architect of Chandigarh are among the earlier recipients of this honour. Correa's contribution is in the field of low-cost housing.
32. Squadron leader Rakesh Sharma became the first Indian to go into space. He and his companion Wing Commander Ravish Malhotra had been trained for more than a year for the space flight. Finally Sharma was chosen to go into space aboard Soyuz T-11 with two other Soviet cosmonauts, Malyshev and Strekalov. The 7-tonne space-craft which was launched from Baikonour Cosmodrome carried the three cosmonauts into space to get docked to the orbiting Soviet space station Salyut-7. They remained in space for seven days. The three cosmonauts were welcomed by some other Soviet cosmonauts who were already aboard in Salyut-7. Mr. Sharma became the first cosmonaut of India and India became the 14th nation to have put a man into space. The experiments conducted by Rakesh Sharma during his space mission relate to material sciences, bio-medical sciences and remote sensing. He also tested the effects of Yoga in space.
33. The confrontation that developed between the Legislative Council of Andhra Pradesh and the Supreme Court on a privilege issue involving the editor of Ecnadu still remains unresolved. The editor Mr. Ramoji Rao was summoned to the bar of the Council and, on non-appearance, was ordered to be arrested. The editor obtained a stay from the Supreme Court but the C

wanted to go ahead with the arrest of the editor on the ground that the Court could not interfere in a privilege issue. In the meantime the Andhra Pradesh Chief Minister Mr. N.T. Rama Rao wrote to the President requesting him to refer the matter to the supreme court for its advisory information, However, the Central Government has ignored the pleas of the Chief Minister. In the mean time a direct confrontation between the Council and the Supreme Court was averted by the untimely prorogation of the Council by the Governor on the recommendation of the Chief Minister.

34. In a recent judgement the Supreme Court has held that an election conducted with the electronic voting machines is invalid. The court has pointed out that there is no legislative sanction for the introduction of electronic voting system. The court has said that the Election Commission cannot become a law unto itself. However, it is to be noted that the Commission introduced the voting machines only after consultation with all the political parties and that no political party has raised objection to the modernisation. The court has advised the government and the Commission to impart proper training to the electorate in the use of electronic voting machines.
35. President Reagan's visit to china in April 1984 has brought about much rapport and understanding between the two countries. While the basic differences on Taiwan and other issues remained, the two countries have signed a number of agreements during the visit of the President. The most important pact relates to co-operation in nuclear energy. The agreement will enable American manufacturers to compete for nuclear reactor and components contracts of China.
36. The front-line States of Southern Africa recently had a summit conference in which they emphasised the need for the keeping up the fight to end the South African white-minority rule in Namibia. The meeting of the heads of the States of Tanzania, Zambia, Angola, Mozambique, Botswana and Zimbabew was held at Arusha in Tanzania.

37. In August 1983, the Government announced a number of steps to promote electronics industry in India. In particular it has granted customs and excise duty reductions on electronic items. The Government proposes to set up 'INDONET', a net work of computer systems for easy use of computers by various organisations.
38. The Andhra Pradesh Government has accepted in to recommendations of the Mandal Commission. The main recommendations relate to the reservation of 27% of seats in academic institutions and of government jobs to the backward classes. The Commission has identified about 450 backward classes comprising 52% of the country's population. However, the Secretaries' Committee of the Central Government has been dragging its feet on the acceptance of the Commission's recommendations.
39. Lebanon : Following heavy casualties on the Lebanese army and on the multi-national peace-keeping forces, thousands of soldiers from the small Lebanese army defected to the different militias. The Druze leader, Jumblatt was stepping up the attacks against Beirut and the surrounding areas. Besides the USA decided to withdraw its soldiers from the Lebanese soil. Under such circumstances President, Amin Gemayal was left with no option but to come to terms with Syria, which insisted that the Israel-Lebanon defence pact of 17 May 1983 should be abrogated. After detailed consultations with his cabinet led by the Prime Minister Shafik Wazzan, Gemayal decided to cancel the un-ratified agreement. Israel and USA were notified of the Lebanese position. It may be remembered that the accord was affected with the mediation of the USA which has signed the accord as witness.
40. Bisanatham Railway station in Karnataka became the first totally solar-powered railway station in India. The system was opened in September 1983. It consists of photovoltaic panels which generate power during the day. The power can be stored in batteries upto three days. The solar power is used for lighting lamps, other electric devices.

41. The Colombo Plan for Asia and the Pacific was evolved at the meeting of Commonwealth Foreign Ministance at Colombo in 1950. The Plan is meant to provide technical assistance to the member-countries.
42. St. Kitts and Nevis, formerly known as St. Christopher and Navis became independent of British rule in September 1983, and was soon admitted as the 158th member of the United Nations. The new nation consists of two tiny islands having a population of less than 50000. Its Prime Minister is Kennedy Simonds.
43. The fourth round of Sino-Indian talks were held at New Delhi in October 1983. It is said that a break-through was achieved in the talks for the first time in two years. It may be remembered that since 1982, talks have been held twice in a year between Chinese and Indian official teams. India has all along rejected the Package Plan of Deng Xiaoping. In the last round of talks the two sides are said to have agreed on two important points. One is India's proposal for a sector-by-sector exmination of the issues for an comprehensive settlement. The second point is regarding the relevance of historicity, customs and traditions and in-admissibility of the use of force in settling border issues.
44. A major change of government has happenced in Argentina following the debacle of the militay regime during the Falkland war of 1982. General elections were held in 1983 and Mr. Raul Alfonsin of the Radical Civil Union party came to power as the President, defeating the Peronists. Mr. Prakash Mchrotra, the former Governor of Assam was appointed as the Indian High Commissioner to Britain, Succeding Dr. Sayed Mohammed.
45. 'Impact India', a project against disablement has been launched jointly by UNDP, WHO and UNICEF in collaboration with Government of India. It may bc remembered that at the conclusion of the 1981. International Year of the Disabled, the U.N. General Assembly passed a resolution supporting a campaign for preventing avoidable disablement in the world. The project was advocated by world leaders asscmblcd at Leeds Castle

in England.

46. Recently (May 1984) the Supreme Court has allowed the LIC and other public financial bodies to requisition a meeting of Escorts' share-holders. The public financing institutions have, for quite sometime, been pressing the Escorts management to register the shares purchased by the Caparo group of companies.
47. In the recent elections held at Mizoram, the Mizo Peoples' Conference of Chief Minister, Brig. T. Sailo was routed and Congress-I leader Lalthanhawla formed the first Congress-I government in Mizoram. The call given by the out-lawed Mizo National Front headed by Laldenga to boycott the elections was ignored by the people.
48. The USA has entered into an agreement with Pakistan for the supply of advanced medium range air-to-air missiles (AMRAAM). These missiles would be fitted into the F-16 aircrafts which are to be supplied to Pakistan. Besides they will be also available for use in the other planes of Pakistan Air Force.
49. In September 1983 Yitzhak Shamir replaced Mr. Menachem Begin as the Prime Minister of Israel. Mr. Begin resigned before completing his second 6th year term Mr. Shamir was nominated by Begin but could not muster a stable majority for his government.
50. The 5th Centenary celebration of the birth of Martin Luther was celebrated on 11 December 1983. He is the first person to start the Reformation and to establish the first independent (Protestant) church which goes by his name.
51. Mrs. Jeanne Sauve has been appointed as the first woman Governor-General of Canada in January 1984.
52. The Bombay Natural History Society celebrated its centenary in September 1983. During the celebration the Prime Minister announced the confirmation of the first national award for wild life conservation to Salim Ali, the President of the Society. It is remembered that Mr. Ali is the internationally known ornithologist.

53. The 8th Finance Commission has submitted its final report to the Government of India on 30 April 1984. The Commission was headed by Mr. Y.B. Chavan ; and had as its member Justice C.P.H. Chawala, Dr. Hanumantha Rao, Mr. D.C. Baveja and Mr. A.R. Siramali
54. In a major defence move, the high level Indian defence delegation which visited the Soviet Union in April finalised the details of the follow-up action on the agreement reached during Soviet Union's Defence Minister's visit to India in March 1984. It is said that the Soviet Union has offered the latest TV-142 maritime reconnaissance and anti-ship aircrafts to India. Besides the Soviet Union will speed up the supply of IL-76 transport aircraft to replace AN-32.
55. The Indian Railways have decided to go in for the Advance Warning System (AWS) for modernisation of signals. The new device provides advance warning to the driver and later automatically applies the brake. It will take a few years before the scheme becomes operational in all the rail routes.
56. India's 'Anuradha', the experimental set-up to study anomalous low energy cosmic rays in space has already been designed and is ready to be put on spacelab-3. Spacelab-3 is an European space satellite which is expected to be placed in orbit by the United States space shuttle in November 1984.
57. The spectacular space flight of Space Shuttle 'Challenger' in February 1984 included two firsts. Two astronauts, McCandless and Stewart became the first human satellites, wearing the manned manoeuvring suits. Challenger also became the first spaceship who returned to the same spot from which it was originally launched.
58. The Kissinger Commission on Central America released its report in January 1984. Its main recommendations are increased United States' economic assistance to the countries of the region and increased military aid to El Salvador in its civil war with leftists guerillas. The Commission consisted of prominent members from both Republican and Democratic Parties. and has generally

sided with the Government. However, it has displeased the Administration by endorsing its full support to the peace plan of the Contadora group and by prescribing the condition of better human rights situation for increased military assistance to El Salvador. The report has been heavily criticised by outside countries.

59. Sohrab Modi, the veteran film actor, director and producer died in January 1984. Known as the grand old man of Indian cinema, he was the producer of India's first technicolour film, 'Jhansi Ki Rani' in which he acted in the title role. He was awarded Dada Saheb Phalke Award for outstanding contribution to Indian cinema in 1980.
60. UNESCO has taken up a campaign to preserve the monuments and archaeological ruins at Mohenjodaro. The Pakistan Government is jointly involved in the campaign. It may be remembered that Mohenjodaro was discovered in 1922 and has the primary site for Indus Valley Civilisation.
61. The Postal Life Insurance has celebrated its centenary in January 1984. As a part of its centenary celebration, it has announced a new endowment assurance policy for coverage of risk and for quicker monetary return for the clients.
62. The Indian Government has decided to have the indigenously built Cheeta Tank as the Main Battle Tank (MBT) in future. It may be noted that India's first tank Vijayanta has become slightly obsolete. India is also acquiring the Russian-built tanks, particularly T-72. India is again buying from the Soviet Union the transport aircraft Ilyushin-76 for the IAF. This heavy transport aircraft will replace the aging Soviet An-12 planes.
63. During the recent visit (March) of the Soviet Defence Minister Marshal Dmitri Ustinov, India and Soviet Union reached agreements on many matters of military supply to India. The Soviet Union has given approval to India of the supply of MIG-29 which is superior to the F-16 of USA. The Russian also under-taken to fit the latest sensing system.

naval ships which are under construction in order to enhance the surveillance and detection capabilities.

64. The Soviet President, Mr. Chernenko has recently announced a sixpoint programme of nuclear control to be observed by all the nuclear power nations of the world. Outlining his programme in a meeting in the Soviet Union in February 1984 he has pointed out that these points, if seriously taken, will pave the way for peace. The points are :

- (i) Prevention of nuclear war should be the main foreign policy objective of nuclear power nations
- (ii) Nuclear nations should renounce nuclear war propaganda.
- (iii) They should give up the doctrine of first nuclear strike.
- (iv) They should undertake not to use nuclear weapons against non-nuclear countries under any circumstances
- (v) They should prevent proliferation of nuclear weapons
- (vi) They should reduce nuclear arms gradually.

65. *Iran-Iraq War* : The three year-old Gulf war shows no sign of abating ; instead, the momentum appears to be peaking up. It is said that the Super Powers are supplying weapons to both sides. In particular France has supplied to Iraq the Super Entendard Jets along with Exocet missiles, Iraq seeks to destroy the last oil terminal of Iran at Kharg Island. Iran has suffered heavy casualties but the Mullah regime is now where near seeking a compromise. It has been reported recently that Ayatollah Khomeini is seriously considering the Indian draft for a settlement of Iraq-Iran war dispute.

66. The United States presidential election campaign is in full swing. The contenders for democratic party nomination in the Party Primaries are Mr. Walter Mondale; Mr. Gary Hart ; Rev. Jesse Jackson. Mr. Mondale was earlier Vice-President in the Carter's Administration. Mr. Hart is the dark horse who has been able to break

records in some of the primaries. Jackson is a black civil rights leader and Parson. Mr. Reagan has decided to stand for a second term and there is likely to be no competition to him in his party.

67. King Jigme Wangchuk of Bhutan was the chief guest of honour at 1984 Republic Day celebrations. King Hussein of Jordan was to be the chief guest but he postponed his visit to India due to indisposition. It may be recalled that India has special relationship with Bhutan under a treaty of 1949 which expects Bhutan to be guided by India in matters relating to security, foreign relations, trade and development.
68. R.H. Mhatre India's Assistant Commissioner to U.K. at Birmingham was recently kidnapped by a terrorist group, Kashmir Liberation Front, which demanded the release of some prisoners in Jammu and Kashmir including Maqbool Bhut. Later Mr. Mhatre was shot dead. The British police, Scotland Yard has taken up the investigation. The pro-Pakistan Muslim terrorists of Jammu and Kashmir, Maqbool Bhut who had been kept in Indian prison after conviction for a number of murders was finally executed at Tihar jail in Delhi. On 11th February 1984, When a demand was made by the kidnappers of Mhatre for his release. The executional burial within the jail has caused ripple of protest in Jammu and Kashmir and in Pakistan.
69. *INSAT-IB*: The second multi-purpose satellite of India was launched into space on 31 August 1983. It was carried aboard the space shuttle Challenger and was left into open space by the first black American astronaut Guion Bluford. The satellite was successfully placed in its permanent geo-stationary orbit at a height at 36000 km. above the equator. *INSAT-IB* also faced some initial problems, as in the case of *INSAT-IA*. However there are basic differences between the problems faced by the two satellites, although their design and functioning are identical. The deployment of C-band antenna faced serious problem in *INSAT-IA*, but this part of the operation was very smooth for *INSAT-IB*. Deployment of the solar array was a problem for *IB*.

but the manner in which the problem was tackled differed. In the case of INSAT-IB the opening of solar array was finally achieved by exposing that part of the satellite to the sun so that it could be heated up. It has been noticed that INSAT-IB was hit by an unidentified small object immediately after it was released from the Challenger's cargo bay, but this accident might not have had any impact on the working of INSAT-IB. Unlike INSAT-IA which was launched by an expendable Delta rocket at a cost of \$26 millions. INSAT-IB was released into space from Challenger at a cost of \$ 11 millions. New INSAT-IB is stationed at 74°E on the Equator at the slot allotted to INSAT-IA earlier. The government has decided to put into orbit INSAT-IC by 1986.

70. In the controversy regarding Non-Resident Investment (NRI), the Reserve Bank issued a clarification in September 1983. The clarifications make the Caparo group of companies owned by Mr Swraj Paul, eligible for purchase of shares in Indian companies such as Escorts and DCM. Besides the ceiling of 5% prescribed by the RBI will apply only to purchase of shares made after 2nd May, 1983. It may be remembered that the managements of these companies have refused to register the transfer of shares purchased by the Caparo group of companies.

71. *The World Energy Conference* : The Prime Minister of India who inaugurated it suggested a Five-Point Action Plan for harnessing renewable sources and for conserving energy. The 5 points are (i) Application of new biological advances in bio-mass production (ii) Developing photo chemical techniques to produce hydrogen from water to be used as motor fuel. (iii) To devise energy storage methods to make transportation less dependent on oil. (iv) To develop photovoltaic devices to get electricity directly from sunlight. (v) To development integrated energy system. It may be noted that World Energy Conference is a permanent organisation having headquarters at London. It started organising the triennial meetings of energy scientists in 1968. The last conference was held at Munich. This is the first time the World Energy Conference has been held in an Asian

country. Mr. T.R. Satish Chandra, Secretary to the Government of India in the Ministry of Energy was elected as the president of the conference for the next three years. He has taken over from the Secretary of Energy in West Germany. The theme of the conference was 'energy-development-quality of life'. The emblem of the conference represented fire, sun, air, earth and water, the five basic elements of life encompassed by 'Om'. 81 countries are members of the World Energy Conference to which People's Republic of China was admitted as a full member in New Delhi.

72. The Supreme Court has held, in a unanimous verdict in September 1983, that hanging by the rope is constitutional method of execution and need not be replaced by other modes such as electric chair, gas chamber, lethal injection or shooting. It may be remembered that two years back the Supreme Court had upheld the validity of death sentence.
73. United States invasion of Grenada: The internal turmoil in Grenada, a tiny country in the Caribbean, resulted in U.S. invasion of Grenada. Mr. Maurice Bishop, the Prime Minister of Grenada had come to power in 1979 after ousting the duly elected Prime Minister, Mr. Eric Gairy in a coup. When he wanted to restore democracy after a few years of military rule, the military men got nervous and deposed Bishop in a coup. Later on 20th October 1983 he was killed by the military Junta. It appears that in view of the curfew imposed throughout the island, the U.S. students in the island were kept under a sort of detention. It is in this context that the US invaded the island with a small force on 25th October 1983. Small American countries such as Antigua, Barbados, St. Lucia and Jamaica had also supplied a few soldiers to make the invasion a common operation of the Caribbean countries. The US administration justified the invasion on the ground that its citizens had to be protected, that further Chaos had to be curbed and the Leftists who had seized power had to be removed. Many countries of the world condemned the U.S. action. The Security Council could not pass resolution deploring the U.S. invasion because the USA exercised its veto.

74. *NAMEDIA Conference* : The first ever Non-aligned Media Conference (NAMEDIA) was recently held at New Delhi. The conference was inaugurated by the Indian Prime Minister. The conference emphasised the need for correcting the distortions in the Western media regarding the news relating to the Third World countries.

BITS

1. Mr. K.S. Bajpai has recently been appointed Indian Ambassador to USA, replacing Mr. K.R. Narayanan.
2. General A.S. Vaidya has recently taken over as the Chief of the Army Staff in India. Lt. Gen. S.K. Sinha, the Vice-Chief was superseded.
3. Dr. M.S. Swaminathan of India has recently been re-elected the Chairman of the council of F.A.O. for the second two-year term.
4. Mr. Brajesh Chandra Mishra has recently been given extension for an year as the United Nation Commissioner on Namibia.
5. Queen Elizabeth was in the news in India when she came to India in November 1983, on a ten-day state visit. She also inaugurated the Commonwealth Summit. This is her second visit to India since 1961.
6. The biennial Filmotsav 1984 was held at Bombay in January 1984. It may be remembered that Filmotsaves come in alternate years and are non-competitive film festivals.
7. The newly-run Vivekananda Express are to connect Jammu Tawi and Kanyakumari; New Bongaigaon (Assam) and Kanyakumari. They started running from 1984 Republic Day.
8. The Delhi University celebrated its Diamond Jubilee recently.
9. The Asiatic Society in Calcutta is celebrating its bi-centenary celebration in January 1984.
10. The Golden Jubilee of Indian National Science Academy is being celebrated in 1984.

1. The Defence research and Development Organisation (DRDO) is celebrating its Silver Jubilee in January 1984.
2. Recently (February 1984) the Indian Prime Minister laid the foundation stone for building a new capital for Assam at Pragjoythishpur near Guwahati.
3. The third International Conference of Appellate Judges and the Conference of Commonwealth Chief Justices were held simultaneously at New Delhi in March 1984.
4. L. Strougal, the Prime Minister of Czechoslovakia visited India recently.
5. Mikhail Sholokhov, whose novel 'And Quiet flows the Don' won the Nobel Prize for literature in 1965, died recently. He was a Russian literatuer who supported the Soviet regime.
6. Mr. Jorgea Illueca, the Vice President of Panama has become the President since February 1984.
7. Malika Pukharaj, the famous Pakistan singer visited India at the invitation of the Indian Council for Cultural Relations.
8. Mr. T.N. Chaturvedi, former Union Home Secretary has been appointed as the new Comptroller and Auditor-General of India, succeeding Mr. Gian Prakash.
9. National Democratic Party, a new political party has been inaugurated in February 1984. It is headed by Dr. Chenna Reddy, the former Chief Minister of Andhra Pradesh.
10. The 5th Planetarium in India has been opened at Teen Murthi House in New Delhi, founded by Jawaharlal Nehru Memorial Fund and has been named after him.
11. In the recent bienneal Rajya Sabha elections, the Congress-I got 48 out of 73 seats, thereby raising its strength in the house to 153. This number is 7 short of two third' majority for the party.
12. The fifth General Assembly of the World Tourism Organisation was recently held at New Delhi.
13. The National Aeronautics and Space Adn (NASA) of USA celebrated its Silver Jubilee

24. The year 1983 was celebrated as the world telecommunication year throughout the world under the auspices of the U.N. General Assembly.
25. The Third World Hindi Conference was held at New Delhi in October 1983. The World Sindhi Conference was also held at New Delhi in the same month.
26. In November 1983 the Indian Prime Minister inaugurated the mahi-Bajaj multi-purpose project with a dam at Banswara in Rajasthan. The project is expected to benefit Rajasthan, Gujarat and Madhya Pradesh.
27. Recently the last two volumes of the 90-volume 'Collected Works of Mahatma Gandhi' was released in a simple function at New Delhi. It may be remembered that these volumes have been brought out by the Publications Division of the Government of India.
28. Recently the Indian Prime Minister commissioned the Hidkal Dam across river Ghataprabha in Karnataka. It is part of the multipurpose project which goes by the name of Ghataprabha and is designed to irrigate 3 lakh hectares of land.
29. Mr. Jayanth Shah of Kenya retained his title as the winner of the 4th Himalayan Car rally held in October 1983. It may be recalled that he won the third rally last year. The rally covered a length of 4000 km through mountainous terrain starting from Delhi and ending in Delhi.
30. The hydro-electric project in the Silent Valley has been quickly given up by the Kerala government following the advice of the Central Government. M.G.K. Menon Committee had advised the Central Government against constructing the dam in this equatorial rain forest area.
31. India has built the first indigenous melting furnace at the Railways Wheel and Axle Plant at Bangalore. This furnace is a high technology product which is capable of melting metals much faster than an electric arc furnace.
32. The Indian Anthropological Society has celebrated its silver jubilee in December 1983.

33. Information has been given in the Parliament that India has 1,197 islands—723 in the Arabian Sea and the rest in the Bay of Bengal. Of these 577 are inhabited.
34. Masao Fujioiko : The President of the Asian Development Bank, visited India in November 1983.
35. The United Nations General Assembly has declared 1987 as the year of shelter for the homeless.
36. A defence study has revealed that Pakistan's per capita defence expenditure is \$ 20/- as against India's \$ 8/-. In the study, Singapore tops the list.
37. Richard Von Weizsaecker has been elected by the ruling political party, Conservatives, to succeed Mr. Karl Carsten as the President of West Germany. It may be remembered that Carsten visited India Sometime back.
38. A rail-cum-road bridge is to be built across Brahmaputra at a cost of more than Rs. 100 crores. The foundation stone for this bridge was laid at Pancharatna in Assam. The bridge will connect the railway in the south bank of the Brahmaputra with the north bank railway line.
39. T. Bala Saraswathi a noted Bharata Natyam exponent and choreographer in Madras died recently. She was the first recipient of the Sangeet Natak Akadami award for Bharata Natyam in 1955.
40. The 12th International Leprosy Congress was held at New Delhi in February 1984. It was pointed out that nearly one third of the 12 million leprosy patients in the world are in India.
41. The silver jubilee of the Soviet-aided Bhilai Steel Plant was celebrated in February 1984. The Soviet Deputy Prime Minister Dymshits was in India to take part in the celebrations.
42. Recently (April 1984) there was a military coup in Guinea. The country had been ruled for nearly a generation by the elderly statesman of Africa, Mr. Sheku Toure. However, there was no true democracy in the country.
43. The 100 MW research reactor R-5 which is for con-

struction has been named Dhruva. It may be remembered that the earlier research reactors are Apsara, Cirus, Zerlina and Purnima.

44. Recently (September 1983) an Indian civilian aircraft made a historic flight to China after a period of 25 years. The aircraft entered the Chinese territory in Tibet to rescue pilgrims who had attempted to reach Kailash-Mansarovar.
45. Mr. A.P. Sharma, the Governor of Punjab exchanged places with Mr. B.D. Pandey Governor of West Bengal in November 1983.

PART VII
AWARDS



1

AWARDS

1. The 1982 Bharthiya Jnanpith Award was given to the Hindi poetess, Mahadevi Verma. She received the award in the hands of the British Prime Minister Mrs. Margaret Thatcher in New Delhi in November 1983. She won the award for her collection of poems 'Yama'. The award carried a citation to the effect that the poetess had instilled in the India women pride and self-respect and had taught them the validity of their own contribution to life. The award also included a cheque for Rs. 1.5 lakh along with a medallion.
2. Queen Elizabeth of England conferred on Mother Teresa the prestigious Order of Merit, the highest British award without the title of nobility attached to it. The award is considered a personal gift of the queen and is given to only 23 living persons at a time. At present Mother Teresa is the only living non-British holder of the award. The award had been conferred on Dr. S. Radhakrishnan in 1963. In a simple ceremony at Rashtrapati Bhavan, the queen personally handed over the award to the Mother on November 24, 1983.
3. The Recipients of the three Jannalal Bajaj awards for 1983 for social service, rural development and cause of women respectively are T. Ramachandra Rao of Andhra Pradesh, Dr. Manibhai Desai of Pune and Mrs. Pushpa-ben Mehta of Gujarat. Each award carries a cash prize of Rs. 1 lakh.
4. *Nobel Prizes (1983) :*
Physics : Dr. S. Chandrasekhar and William Fowler (U.S.A.) for 'their research into how stars are made of'.

Chemistry ; Henry Taube (U.S.A.) got the Prize for, his work in the mechanisms of electron transfer reactions, especially in metal complexes',

Medicine : Barbara McClintock (Britain) was awarded the Nobel Prize for medicine for 'her discovery of mobile genetic elements'.

Peace : Mr. Lech Walesa (Poland) the trade union leader and founder of the now-outlawed Solidarity got Peace Prize 'for his contribution to ensuring workers' right to establish unions'.

Literature : William Golding (Britain) was awarded the Nobel Prize for literature for 'his novels which with the perspicuity of realistic narrative art and the diversity and universality of myth, illuminate the human condition in the world today'.

Economics: Gerard Debreu (U.S.A.), won the Nobel Prize for economic for his research on 'market equilibrium in which he incorporated new analytical methods into economic theory'.

The Nobel Prizes are presented on 10 December, the death anniversary of Alfred Nobel. Each Prize carries 1.5 million Swedish Kroner (about Rs. 20 lakhs).

5. The Dhanvantary Award for 1983 was given to Dr. B. Ramamurthy, a wellknown Neurosurgen of Madras.
6. The first Piloo Mody Memorial Award for excellence was awarded to the Indian Cricket Captain Kapil Dev in October 1983.
7. Japan has instituted the 'Japan Prizes' to be awarded annually to two scientists or technoloerats whose work in Applied Science contributes to peace and prosperity. Each award will carry a sum of 2,17,000. The awards will start from 1985.
8. The U.N. Population Award for 1983 was shared by the Indian Prime Minister, Mrs. Gandhi and the Chinese Minister for Family Planning Mr. Qian Xanzhong. The awards were presented in a glittering ceremony at the

United Nations headquarters in September 1983. Mrs. Gandhi received the award from Mr. Javier Perez de Cuellar. The award carries \$12,500 in addition to a gold-medal and a diploma. The award is meant to promote the solution of the problem of population explosion by encouraging family planning efforts.

9. 1983 Nehru Literacy Award has been given to Bombay City Social Education Committee. The Committee has set up many adult education centres in Bombay and promoted adult education.
10. Dr. N.S. Subba Rao of Indian Agricultural Research Institute, New Delhi has been awarded the 1982 Borlaug Award for his contribution in evolving efficient strains of nodule bacterial for different leguminous plants and for the production of a new *Azospirillum* bio-fertilizer for Sorghums and Bajra. The Award is annually given by a Private Company, Coromandal Fertilizers Limited to an outstanding agricultural scientist in honour of Dr. Norman Borlaug who introduced dwarf varieties of wheat in India.
11. The UNESCO has instituted recently the Simon Bolivar Prize. The first recipients are King Juan Carlos of Spain and Nelson Mandela, the South African Black nationalist languishing in a South African prison.
12. *Ramon Magsaysay Awards (1983)*
Award for International understanding : Rev, Schwartz, an American Priest in South Korea.

Award for Public Service : Mr. Fua Hariphitak, a Thai artist.

Award for Government Service : Su Nan-Cheng, the mayor of Taiwan.

Award for Journalism, Literature and Creative Communication arts :

Rev. Marcelline Jayccody, a Sri Lankan priest known for his contribution to music and performing arts.

Award for Community Leadership : Mr. Anton Socdi-jarwo. an Indonesian engineer.

13. *Sanjay Gandhi Awards* : Since 1983 three awards have been instituted for environment and ecology ; family planning and population control ; energy. Each award carries a cash prize of Rs. 1 lakh and a citation. These awards are conferred by Sanjay Gandhi Memorial Trust. 1983 awards have been given to Professor Ramdeo Misra (environment and ecology) ; Family Planning Association of India and Dr. M.K. Krishna Menon (family welfare and population control) ; and Madras Atomic Power Project senior engineers (energy).
14. The 1983 U Thant Award was recently conferred on Mr. Jorge E. Illueca of Panama who was the President of the 38th session of the U.N. General Assembly (1983). The award is for 'his long-term efforts for world peace and his encouraging personal example in supporting the higher ideals of the United Nations Charter.
15. *1984 Republic Day Awards* : Bharat Ratna and Padma Vibhushan awards were not conferred on anyone. Padma Shri award has been conferred on 52 persons. Among the 17 persons who received the Padma Bhushan award are Vijay Tendulkar (a noted controversial Marathi playwright) Mr. Michael Ferreira three times world (billiards champion) : Dr. H. Narasimhaiah (a former Vice-Chancellor of Bangalore University) ; Mr. Shivaji Ganesan (cine actor and M.P.) ; Mr. Natwar Singh (a career diplomat) ; Dr. Ishwari Prasad (a well-known historian and Mr. Horace Alexander (an American associate and biographer of Mahatma Gandhi).
16. Mrs. Rukmini Devi Arundale, a well-known classical artist has been conferred the Kalidas Award for 1983-84 by the Madhya Pradesh Government. The award given for contribution to creative arts carries an amount of Rs. 1 lakh along with a plaque.
17. Mr. Sundarlal Bahuguna has been conferred the 1984 D.M. Singhvi Memorial National Integration Award for his contribution to the cause of ecological conservation. Mr. Bahuguna is the leader of 'CHIPKO' movement in Uttar Pradesh.
18. The 1982 Kalinga Award for popularisation of science has been given to Oswald Fronta-Pessoa, a Brazilian

biologist. The 1983 Kalinga Award has gone to the Bangla Desh physicist, Abdulla Sharafuddin.

19. The 1984 E.M. Forster Award has been conferred on Mr. Pritish Nandy, a journalist of India.
20. The Tagore Award, instituted by the Asiatic Society of Calcutta has been given to Mrs. Indira Gandhi for her 'creative contribution to human culture'. The award has been instituted by the Society in honour of Rabindranath Tagore.
21. Baba Amte, a veteran Gandhian who has spent his life for the welfare of leprosy patients is the proud recipient of the 1983 Damien-Dutton Award, instituted by the Damien Dutton Society for Leprosy Aid at New York.
22. The Third R.D. Birla Memorial Award for 1983 has been conferred on the Nobel laureate Prof. S. Chandrasekhar. The award has been instituted by the Indian Physics Association to be given for distinguished contribution in the field of physical science.
23. The B.D. Goenka Award, instituted in 1983 for excellence in journalism has gone to Mr. V.K. Narasimhan, a journalist and editor. The award carries an amount of Rs. 1 lakh.

PART VIII
SPORTS

1

SPORTS

ATHLETICS

1. In the International Track and Field Championships held at Bangkok in November 1983, China was the topper with 9 gold medals although Thailand won the maximum number of all medals.
2. In the Asian Athletics Championships held at Kuwait in November 1983 the Chinese forged ahead of the Japanese. India finished fifth with 3 gold medals, 6 silver and 6 bronze.

BADMINTON

3. In the Indian Masters Badminton Championships held at Bombay in November 1983, Denmark's Morten Hansen defeated Padukone.
4. Syed Modi of the Railways retained his position as the Senior National Badminton Champion in the Championship tournaments held at Poona in January 1984. Ami Ghia of Maharashtra regained the National Badminton Women's Championship by defeating the co-Maharashtra, Radhika Bose.
5. In the Asian Zone qualifying tournaments for the Thomas cup (for men) and Uber Cup (for women) Badminton Championships held at New Delhi in February 1984, the South Koreans emerged victorious.
6. The All-England Badminton Championship for men was won by Morten Frost of Denmark beating Li Lingwei of China. The women's title went to the world champion Li Lingwei of China.
7. Indian Vimal Kumar retained his French Cup.

ton Championship title in the tournament held at Paris in April 1984.

BASKET BALL

8. China got the right to represent Asia in the 1984 Olympic Games at Los Angeles in the Men's basketball, having defeated Japan in the Asian Men's Basketball Championships held at Hong Kong in November 1983.

BILLIARDS

9. Michael Ferreira of India retained the World Amateur Billiards Championship in the games held at Valetta in November 1983. He defeated compatriot Subash Agarwal.
10. In the National Billiards Championship held at Cochin in January 1984. Subash Agarwal emerged as the Champion.

CHESS

11. In the National Women's Chess Championships held at Palai (Kerala), in December, 1983, Rohini Khadilkar of Maharashtra was the winner.
12. International master Pravin Thipsay of Maharashtra won the National Chess Championship at Ahmedabad in January 1984.
13. In the National Junior Chess Championships held at Vasco da Gama at March 1984 V Anand of Tamil Nadu won the title.

CRICKET

14. In the India-West Indies Cricket Test series, West Indies won 3-0. Although the series as a whole was a dismal performance for India, Sunil Gavaskar reached new heights and broke many records during this Test series. In the last test held at Madras in December 1983, new records were set up by Sunil Gavaskar. He had participated in 30 Tests, exceeding the record of John Brad-

man; got the highest score in Test series 8307, overtaking Boycott's aggregate of 8114; and took 236 runs not out, which was the highest individual score by an Indian in Test Cricket, the earlier record being 231 of Vinoo Mankad 27 years ago. Known as the little master, Gavaskar was easily adjusted as the 'Man of the Match' at Madras. The 'Man of the series' title was shared by Indian Captain Kapil Dev and West Indies speedster Malcolm Marshall.

15. The West Indies annexed the World Series Cricket Cup trouncing Australia in the series played in Australia in January and February 1984.
16. In the New Zealand Cricket Test Series played in New Zealand in February, for the first time New Zealand beat England.
17. The India-Australia Women's Cricket Test series played in January and February 1984 ended in a draw.
18. Ranji Trophy : the symbol of cricket supremacy in India was won by Bombay defeating the holders Delhi in the games played at Bombay in April 1984.

FOOTBALL

19. B.C. Roy Trophy for Junior National Football Championship was annexed by Goa after defeating the reigning champions Punjab in the Games held at Panaji in November 1983.
20. Poland won the glittering Nehru Gold Cup for football beating China at Calcutta in January 1984.
21. The Federation Cup for women's Football Championship was retained by Manipur in the games played at Deoria in February 1984.
22. Manipur and West Bengal shared the National Women's Football Championship in the games which ended at Gorakhpur in February 1984.
23. Argentina won the Merdeka Cup in the Football tournament held at Kuala Lumpur in October 1983. They defeated Algeria.

HOCKEY

24. Railways emerged victorious in the National Women's Hockey Championships held at Simla in November 1983, defeating Punjab.
25. Indian Airlines won the Rangaswamy Cup for National Hockey Championship in the match played at New Delhi in February 1984.

OLYMPIC

26. Winter Olympic Games 1984 : The XIV Winter Olympic Games were held at Sarajevo (Yugoslavia) in February 1984. In the total medals tally East Germany came first, followed by the Soviet Union. The Soviet Union won the winter Olympic Hockey gold medal for the sixth time, a world record. The different events were slalom, ski jumping, cross-country skiing, down hill race and biathlon. The Mahre twins of the United States established an interesting record by coming first and second in the men's slalom.

TENNIS

27. Jimmy Connors won the US Open Men's Singles Title for the fifth time, defeating Ivan Lendl of Czechoslovakia in the championships played at New York in September 1983. In the same tournaments, Martina Navratilova won the Women's Singles for the first time; defeating the six-time champion Chris Lloyd.
28. National Lawn Tennis Championships was won by Nandan Bal of Pune (men) and Vidya Priya of Tamil Nadu (women) in the games held at New Delhi in November 1983.
29. Australia won the Davis Cup for Tennis for the twenty-fifth time in December 1983.
30. Martina Navratilova won the highest-prized Virginia Slims Tennis Championships at New York in March 1984. She defeated Chris Lloyd.

PART IX
GENERAL ENGLISH

1

ESSAY-WRITING

Essay-writing is, quite naturally, the foremost exercise in Descriptive General English. Writing an essay is not difficult affair. What is really difficult is to write a good essay. The normal length of a short essay is ~~about 700 words~~ but you may be required to write an essay of only 500 or 300 words. This makes the work a little more difficult since you have to be extra careful not to waste words in your essay. However there is a big advantage in writing such a small essay i.e. you will have plenty of time to perfect your 'masterpiece'. The technique of essay-writing is the same, whether the essay to be written is short as long, simple or serious.

As you are aware, essay is an original composition and so all the essentials of original composition are relevant to essay-writing also. We give below, in brief, the salient aspects of an original composition, in general and an essay, in particular.

ORIGINAL COMPOSITION

1. The language aspects of an original composition are vocabulary, grammar, diction and form. The requirement of 'exact expression' will be satisfied if your vocabulary is alright. But at the later stage nothing much can be done to improve one's vocabulary. Only, try to use the appropriate words and terms in every context. Effectiveness of your expression will be proportional to your mastery of grammar and felicity of diction. Elementary rules of grammar should be known to the candidates. So, write your sentences carefully, avoiding, as far as possible, glaring grammar mistakes. (2) Regarding the matter in any original composition, the most important aspect is presentation of matter. Given a topic, all of us should be able to collect a mass of facts and ideas, pertaining to it. So, what is important is to

we present these facts and ideas. Considering the different aspects of the presentation of matter, we would like to focus our attention on two aspects—relevance (scope) and development of thought. Relevance is to be judged in the light of the proximity of an idea or a fact to the topic given. Since your essay is to be very short, please note that only the immediately relevant matter should find a place in your essay. Secondly, there should be a clear development of thought in your essay. This can be achieved by arranging your Points properly before you start writing the essay. The Points should be such that a reasonable and balanced coverage is given to the topic, (3) Whenever certain points of view are to be analysed or discussed, do not take a partition stand. Rather, be clear about a particular point of view and consider the pros and cons before expressing your opinion on the matter. (4) Basic limitations on time and on the number of words required in the answer should be born in mind. (5) Regarding the form of essay, you are well aware that there should be an Introduction, a Conclusion and the Body of the essay, divided into paragraphs.

ESSAY-WRITING

We discuss below the different stages of the work of essay writing within the constraints of an Examination. (1) Assessment of topics and selection of the topic. You are given a choice of topics. This choice should not be frittered away by choosing carelessly any of the topics. You should assess the essay-potential of each topic and then should choose the one having the maximum essay-potential for you. Once you have selected the topic, you should never change your mind. (2) Thinking on the topic and writing the Points. At least for a few minutes think on the topic and collect your ideas on the relevant matter before you start writing anything. Once you have tentatively fixed a broad outline for the essay, jot down the Points for paragraphs. Points are written for your guidance and so you should not hesitate to change the order of Points or their substance. Ensure that each Point is relevant to the topic and connected with it in the immediate context. Also the Points should cover all the major aspects of discussion on the topic in broad terms. You may write about 6 to 10 points, including the Introduction and the Conclusion. Within these Points it may not be possible

to cover each and every aspect of the subject-matter. But you need not worry in the least if you happen to omit one or two aspects of the topic. In fact, you should rather avoid multiplying the number of Points and Paragraphs, thereby treating each Point cursorily in a sentence or two. When a Point is taken up for discussion, it should be treated substantially in a paragraph of not less than 50 words. (3) Writing the rough-copy of the essay. We advocate strongly that you write a draft and a fair-copy for the essay. This is easily possible when a short essay is to be written. If you want, you may assign sub-headings to paragraphs; such sub-headings should be based on the Points covered by successive paragraphs. Even when you do not give sub-headings, each paragraph should be clearly identifiable with a mini-theme of its own.

Note how an appropriate introduction may be written. Think of a suitable broader context and in that context introduce the subject matter of discussion. Only if the examiner feels impressed with your introduction, he will feel interested to read the body of the essay. If your essay is very short, you need not write a separate paragraph for 'Conclusion'. In other words, the last paragraph in your essay may simply deal with the last substantial Point on the topic and no concluding remarks of your own need be given. Of course, there is no harm even if you write a formal 'Conclusion'.

(4) Writing the fair-copy of the essay. Before you start fair-copying go through the draft essay and make the necessary corrections. Only grammar and spelling mistakes should be corrected. If you begin to alter the ideas, there will be no end to it. You can easily fair-copy an essay of 300 words in about 15 minutes. After completing the essay (fair-copy) count the number of words approximately and indicate it in brackets at the end of the essay.

Note : IF you try your best to observe all the rules of essay-writing and to do the work consciously, you will find that there is a lot of improvement in your performance.

ASSESSMENT OF ESSAY TOPICS

Essays of matriculation standard deal mainly with aspects and occurrences of daily life and personal life. A few topics be subject-oriented i.e. on political, social and economic

of life. At times, purely factual topics which require a lot of factual information for writing a good essay may be given. As soon as you take up a topic, you should assess its essay-potential, by which we mean 'how far you will be able to write a good essay on the topic'. Thus essay-potential of a topic is subjective i.e., it will vary from person to person. We illustrate below this concept.

TOPIC 1 : 'The Hero I Admire' : This topic may appear inviting but you have to be careful. The first problem is selection of a non-controversial hero and the second, having sufficient factual information about him. If you are to write an essay on this topic in the Examination Hall, you should have prepared the essay earlier. However, one may write a good essay on this topic if one is prepared. We won't advise you to select the topic for essay in the Examination because of the two problems, mentioned above. But if you are interested, you may prepare an essay, along the following lines :

- (i) Introduction on heroes and hero worship;
- (ii) The brief particulars regarding the achievements and historical importance of your hero;
- (iii) The admirable qualities in the hero;
- (iv) The inspiration you have drawn from him.

TOPIC 2 : 'My Likes and Dislikes' : This is a topic having very little essay-potential. If you write this essay, you will be exposing to public gaze your inner self (real or imaginary). Non-puerile matter on such a topic is hard to come by. So avoid it.

TOPIC 3 : 'Some historical monuments of India'. This is a descriptive topic on which a good-essay can be written if you are well-informed on a few historical monuments. If you have visited them some time in your life, your first-hand impression will help you very much. One way of treating the topic will be to take up a few monuments (4 to 5) and to treat them one by one, each in a short paragraph. The essay can be written in another way by discussing the different common aspects of some monuments, taken together.

TOPIC 4 : 'An Unpleasant Neighbour' : It requires a skilful writer to write a humorous essay on this topic. If you are to write the essay, you will only be exposing your petty mind and unsociable traits. So never choose such a topic.

TOPIC 5 : 'Mountaineering' : Mountaineering is an adventure, a sport and a hobby. If you have some practical experience

in it, you may write a descriptive essay on the different aspects of mountaineering. Some points for this topic will be :

- (i) Introduction—man's spirit of adventure:
- (ii) Preparations to be made
- (iii) Arduous nature of the journey—how to make it enjoyable.
- (iv) Beneficial effects of mountaineering.
- (v) Conclusion—the encouragement to be provided for this exercise

TOPIC 6 : 'My Favourite Author' : This is a good topic for an essay if you have already fixed your favorite author and are able to write something about his major literary works. An ideal topic for English Literature Students. The essay should be written descriptively with the following general Points :

- (i) Introduction—the galaxy of writers and the place of your favourite author among them;
- (ii) The major works of the author;
- (iii) What specially attracted you to him—explain the special features of his writings;
- (iv) Describe how you have benefitted by his literary works.

TOPIC 7 : 'A Harvesting Scene' : A good essay on this topic requires graphic description which will be beyond the competence of an average candidate. Besides you may not have seen a harvesting scene in your life and will struggle hard to find exact expression. So avoid this topic.

TOPIC 8 : 'The Worst Dream of My Life' or 'An Ugly Dream' : Dream is always incoherent and the description of a dream will be still more incoherent, if not handled carefully. Besides your puerile thoughts will have a field day in an essay like this. So do not take up such topics.

TOPIC 9 : 'A Railway Journey' : This is a suitable topic for many candidates. The essay-potential of this topic is very high. All of you should have experience of a railway journey. So recollect a particular journey which you performed and describe it with gusto. Points can be evolved in two ways. You may write the essay in the form of a narrative relating the sequence of events during the journey. The Points may run as follows :

- (i) Preparation for the journey (no need for a separate Introduction);
- (ii) What happened at the boarding railway station;
- (iii) The events in the train;

- (iv) How you spent the time;
- (v) What happened at the alighting station.

You may end the last paragraph saying that you reached home (or destination) with happy memories of the memorable journey. Note that this essay should be written in the first person singular and in the past tense since you will be narrating your personal experience. Another type of essay may be written on the same topic in a descriptive form, considering the different aspects of any general railway journey. Even here you should take into account only a particular journey and should not talk of different types of railway journey. While writing the essay, use first person plural throughout. The following Points will be in order.

- (i) Introduction : railway journey, a common experience now-a-days;
- (ii) A rich experience—an exercise in social relations;
- (iii) Thrill and pleasure of the journey;
- (iv) Educative value—seeing new places;
- (v) The small inconveniences and uncertainties associated with the journey.

TOPIC 10 : 'The Autobiography of an Old Car'. The essay will have to be both imaginative and narrative. Unless your imagination is really fertile, your essay is bound to be drab and not much different from that of a school boy. Safe to omit such topics.

TOPIC 11 : 'An Ideal City' It is not difficult to write some essay on this topic, but to write an impressive, short essay will really be difficult. You will have to think of different aspects of city planning, viz. transport, civil supplies, housing, parks, pollution control etc. It is impossible to cover all the aspects in an essay of 300 words. So you may deal with some aspects only. This topic need not be your first choice.

TOPIC 12 : 'How I would deal with the population problem of India. This is a subject-oriented essay of the matriculation standard. The main Points of the essay should be based on knowledge of the subject i.e., the population problem of India but the personal touch also should be there. Note that the topic is restricted to the solutions to the problem. So you should not dwell at length on the causes and effects of the problem. The solutions should be presented as your own, not as general solutions. You may explain why you prefer certain,

solutions to others and may indicate how you will implement the solutions and will obtain results. This is an essay, having good essay-potential. So you may write this essay and send it for evaluation.

TOPIC 13: 'The life of a modern housewife'. This is a typical topic for your work and admits of the discursive treatment where you describe and analyse, but not rigorously. There is nothing personal about the topic and it deals with a phenomenon of daily life. You should be able to collect a lot of matter relevant to this topic. You may work out your own Points or can use the following :

- (i) Introduction : the impact of modernization on family life;
- (ii) The daily routine of a housewife;
- (iii) Problems in daily life;
- (iv) The positive side of the life of a housewife—her joys, holidays and outings.

TOPIC 14 : "Leisure" Its use and abuse. This is a good topic for writing a discursive essay. It deals with an aspect of day-to-day life and there should be no dearth of matter to write on. The following Points are relevant.

- (i) Introduction : Modern mechanical life—leisure, an antidote;
- (ii) Use of leisure—aim of leisure—leisure pursuits.
- (iii) Abuse of leisure : extra work—gossiping;
- (iv) Use and abuse dependent on individuals.

TOPIC 15 : "Hopes and fears for the 'Computer age' man": This is a topic requiring imaginative treatment and discursive treatment simultaneously but there is nothing personal or puerile about the topic. So, one can write a good essay on the topic, using the following Points and a bit of imagination :

- (i) Introduction : The advent of the Computer age;
- (ii) The 'Computer age' man and his life;
- (iii) His hopes—free from manual labour, diseases and poverty—full scope for development;
- (iv) Fears : too much leisure and ennui—population explosion—Scarcity of resources—'Computer war';
- (v) Conclusion : Man has to choose between a bright future and self-annihilation.

MODEL ESSAYS

Essay 1: Should mothers go out to work? (1979 I.A.S. Main).

- (i) Introduction;
- (ii) The case of mothers who go out because of economic compulsion rural women—lower middle class and the poor;
- (iii) Career women and socialities;
- (iv) Sharing household work with men, the real solution.

The days of male chauvinists are over. It is no more taboo for a women to go out to work. But the case of mothers is slightly different. Rather moved by their pitiable plight, we ask the question, Should mothers go out to work? The answer will vary, depending on the circumstances of women.

All of us have seen the pathetic sight of carrying or nursing mothers going out to work. They go out because of economic compulsion. Given the opportunity, they will gladly stay at home. Many rural women have a two-fold responsibility—to earn the bread and to manage the household. Rural mothers working in the fields all the day with their infants around and doing housechores later at night is a common sight. In their case, what is the use of simply asking whether they should go out to work? In cities and towns, many educated and uneducated women of the lower-middle class and the poor work in a similar predicament. For them, it is a question of making both ends meet. It is the duty of the employers and the state to see that these working women enjoy the maximum benefits of service during pregnancy and nursing period.

There are women who go out to work for the full development of their personality. Among them are the women-libbers' who want to complete with men in every field. They want to come up the hard way though they can live without working. It is wrong to put a full-stop to their career during motherhood. There are yet a few ambitious women and socialites who will go out, work or no work; and nobody can stop them.

Thus, it is clear that there is no use asking the question whether mothers should go out to work. Rather, we should be interested in providing some relief to working mothers. This can best be done by a proper change in the attitude of men. The men should come forward to share, equally, with their

better halves, the housechores day after day. (340 words)

Essay 2 : What freedom means to me (1971 I.A.S. Main).

Note : In the essay you will have to discuss your opinions on freedom. So the essay should not be confined to a discussion of the political theory of freedom. Since you are directed to express your personal opinions or perceptions you may freely write in first person singular.

- (i) Introduction—freedom means different things to different people;
- (ii) Personal freedom as applicable to different aspects of life;
- (iii) Political, economic and social freedom;
- (iv) Discipline and freedom;
- (v) Conclusion.

Freedom means different things to different people. To a man with empty stomach, a morsel of food may signify freedom from hunger. To the African in Namibia, freedom may mean the end of the racist regime in Pretoria. To Rousseau, the philosopher, conforming to the General will meant freedom. To a life-convict, discharge from the prison may appear to be real freedom. To a man suffering from an incurable and painful disease death may open the doors to freedom. In this essay let me explain, in brief, what freedom means to me.

The age-old definition of freedom as 'the absence of restraint' still has its attraction for me. In many aspects of life which do not affect other directly, I would like to be left to myself—to my whims and fancies, if you describe so. I refer to things like the food, I eat, the dress I wear, my hobbies and tastes etc. Regarding certain aspects of my personal life, e.g. my education, profession or marriage, I would like to consult my family members but ultimately the choice should be mine.

When I come to the wider world, I understand that polity is the best which provides for us real freedom in political, economic and and social aspects of life. I am happy to be a citizen of the largest democracy of the world that guarantees to us many political freedoms and fundamental rights. I would like to enjoy economic freedom in the form of two square miles a day in return for honest work.

One man's food should not become another man's poison. This is possible only if freedom is coupled with discipline. If

want freedom to copy, political parties desire freedom of normal life and criminals clamour for freedom to carry out anti-social activities, hardly anyone can enjoy his freedom. Laws, rules, and regulations are required, to a certain extent, to enforce discipline, though I would prefer self-discipline to the discipline imposed from above. (324 Words)

Y 3 : Life without newspapers (1979 I.A.S. Main).

- (i) Introduction—importance of newspapers;
- (ii) What will happen if there were no newspapers—different groups of readers;
- (iii) Occasions when we miss the daily—how we react;
- (iv) Conclusion.

Modern man has saddled himself with many necessities. Not more is he content with food, clothing and shelter. One of the items that have almost become the necessities of the modern man is the daily newspaper. Many of us start our day with reading of a newspaper. In the essay let us envisage what life would be like without newspapers.

Today newspapers mean different things to different persons. So if there were no newspapers, different groups of people would be affected differently. The man of knowledge would miss the major source of his knowledge on current affairs. Many politicians and local leaders would lose many opportunities for politicking. Sports-lovers would feel miserable not knowing the latest results in sports-events. The frivolous would miss sensational reports of crimes. For many, life might become dull without the comic strips, cross-word puzzles and cinema reviews, provided by the dailies. Business and employment would suffer incalculably without the advertisements in newspapers. The other communication media, viz., radio, television and cinema can help to an extent but cannot effectively fill the vacuum created by the vanishing of newspapers.

There are several occasions when we miss the news. During a general strike or strike by journalists or pressmen we wake up to a day without our favourite dailies. If one paper fails, immediately we switch over to another. Major natural calamities like flood, fire or quake, we have time to think about newspapers. Sometimes, one the dailies during dislocation in one's daily routine travel, illness or pre-occupation with urgent matters.

For many of us, newspaper is no more a mere utility : it has become a passion and a part of life. Yet there are millions of uneducated rural folk to whom existence or non-existence of newspaper will make no difference. Has not each one of us, at times, longed for the life of our forefathers who lived without newspapers but with abundant peace and contentment?

Essay 4 : How science has changed our daily life (1979 I.A.S. Main).

- (i) Introduction;
- (ii) Modern gadgets and comforts—electricity, fan, cooking gas, stove etc—life style—fashions dress—health and medicine;
- (iii) Daily routine, pursuits—hobbies and entertainment;
- (iv) Goals in life—ambitions and attitudes—scientific temper;
- (v) Evil consequences—pollution, noise, lack of peace, mechanical life—conclusion.

Note : Remember that the topic is concerned with our 'Daily life' and so the impact of science on humanity as a whole, especially modern means of production, danger of nuclear war etc. will be out of place in the essay. Here science includes technology also.

The modern civilization which surpasses all the earlier civilizations in many respects is the gift of science to mankind. Science has left its indelible imprint on every aspect of our daily life so much so that neither the most primitive tribal nor the crudest fundamentalist has been found impervious to the influence of science. Let us discuss, in brief, how science has changed our daily life to our advantage as well as to our disadvantage.

Today all of us are accustomed to the gadgets and comforts provided by science and technology. Electrical appliances and modern vessels adorn almost every house, of course, to varying degrees. Science has profoundly affected our life-style. But for the inventions of the last few centuries, our life-style could not have been much different from that of the medieval men. Modern medicine has achieved many a break-through. Health and medicare have considerably reduced infant mortality and have contributed to longevity in general.

Our daily routine could hardly have been the same as it is if science had not been there. We commute over long di-

communicate through post, telegraph, telephone and radio and in cars, buses, trains and aeroplanes thanks to science. Modern means of entertainment viz. television, radio and newspapers are gifts of science to mankind. Science has gone deeper and changed our inner self. Modern's attitudes, ambitions and goals in life are quite different from those of the pre-science age. Science has blessed us with scientific temper which, however imperceptively, is directing our thoughts and actions.

But science has not been an unalloyed blessing. We have had to pay dearly for the benefits of science, in form of pollution, noise, mechanical outlook and life, and lack of peace and contentment. But it is too late for us to go back. Our life has got inextricably linked to science. It is our hope that science after all, a creature of man, can still be kept as a source of blessing and not as a curse for mankind.

(335 Words)

Essay 5 : Leisure—its use and abuse :

- (i) Importance of leisure;
- (ii) Purpose of leisure;
- (iii) Use of leisure—physical rest, hobby, sports and games extra-curricular activities, entertainment, idling;
- (iv) Possible abuse—laziness, gossip, additional work.

Most of us lead a mechanical life with a rigidly-fixed daily routine. However much we may resent this unhappy state of affairs, we have no alternative. So we have to make the best of what the machine age has to offer. A silver lining in the otherwise—gloomy picture is provided by leisure.

Leisure is the time free from routine work or one's regular job. The rationale of leisure is very sound. Man requires in addition to physical rest that he may free himself from monotony and dullness of regular work and may attend to personal and social obligations. Man does not live alone; he should have time to enjoy himself and to pursue personal interests.

Proper use of leisure will be there if the basic objectives of leisure are realized. Leisure may be used in a variety of ways depending on the nature of one's job. A professor who has to read a lot daily should abstain from reading and may take to some manual work during his

a factory worker may utilize his leisure for reading a magazine or a novel. There are many hobbies—philately, gardening, painting, album-making, bird-watching, shell collection etc—which can be cultivated during one's leisure. Some spend their leisure time in sport and games—playing or watching. Others prefer different means of entertainment, viz., radio, cinema, television, drama etc. to spend their leisure. A few may engage themselves in some social services, cultural pursuits or extra-curricular activities. R.L. Stevenson may argue that idling away the time is the best use of leisure.

Leisure can also be abused. Continuing with one's routine job during the leisure period is the worst type of abuse. It is doubtful whether gossiping in the coffee-house is proper use of leisure. Remaining lazy is surely an abuse of leisure; but you may profitably spend your leisure in 'busy idleness'.

(336 Words)

Essay 6 : The life of a modern housewife.

- (i) Introduction : The impact of modernization on the family—working women and housewives:
- (ii) The daily routine of a housewife:
- (iii) Occasional problems—failure of milk supply, water supply—queuing in the ration shop—family budget;
- (iv) Enjoyment—holidays, outings, entertainment.

Among the most profound changes brought about in the social life of man by the present machine age are the changes in the roles of a family. A new species of women, called working women, has come into offing in cities and towns and the role of the housewife has undergone many changes. By 'housewife' we mean 'the woman in a family who manages the household and is not employed outside her home'.

The daily routine of a typical housewife in an urban middle class family is well known. On any working day she gets up early in the morning, prepares breakfast and gets ready lunch-boxes for her husband and children. After seeing them off she may have a few minutes' respite. Then she goes out for shopping and attends to other housechores. Many housewives manage to have the after noon nap before they prepare themselves to face the din in the evening. Generally, a housewife goes to bed late at night.

Now-a-days most of the housewives have to attend to

problems in supply in addition to their daily routine. One day the milk supply may fail and the other day, water supply. Shortage of sugar, kerosene, oil or any other essential commodity makes the housewife queue up before the ration-shop most of the days. They have learnt not to grumble about such hardship. Control of family budget is another periodic headache to many a housewife. Any unforeseen major expenditure forces her to tighten her belt.

However, the life of a housewife is not an unending tale of sorrows. She has her joyous moments. Sometimes her husband lends a helping hand in her chores. She can relax a bit on holidays. Occasional outings for cinema, picnic and social calls and the visit of her relatives and friends revive her spirits, above all, she enjoys working hard for her near and dear ones.

(312 Words)

2

PRECIS-WRITING

Precis-writing is an important exercise in General English Papers. If you master the art of precis-making, you will be able to write better answers to questions in all subjects, since, while answering any question, you will have to condense the vast matter available on the relevant topic.

You should have noted that the standard of the precis passages given in most of the 'Competitive Examinations' nowadays is that of matriculation. Vocabulary in these passages is pretty elementary and ideas dealt with, quite simple, compared to some of the passages found in the book. But remember that the technique of precis-writing is the same for difficult passages and for the easy ones. Besides, any year, a more difficult or serious passage may be given. So you should be well-versed in the rules of precis-making. Given below are the basic rules to be learned and practised.

(1) The essential aspects of the precis exercise are *comprehension*, *analysis* and *expression*. The understanding of the passage should not pose any problem ordinarily. If you fail to understand the meaning, significance or relevance of one or two sentences in a passage, just ignore them and proceed further. Analysis requires that you discover the Development of Points in the passage and identify the important facts and ideas that should find a place in the precis. Regarding the third aspect i.e. expression, there is nothing to be done at the last minute. If you express your ideas clearly and concisely, you will satisfy the requirement of expression.

(2) In a precis you are expected to present only facts and ideas found in the passage. In other words, you should not add to it even an iota of your own matter. No interpretation, explanation, elucidation or comment of your own on the matters found

in the passage is expected of you. Remember that you should be absolutely faithful to the given passage. We would like to forewarn you of the known weakness of many candidates in this respect. They introduce extraneous matter into their precis, rather unconsciously. So ensure that everything you write in the precis is taken from the passage.

(3) You are expected to write the precis in your own words. *Let the construction of sentences be yours.* You may freely make use of words, phrases and terms found in the passage but do not copy sentences.

(4) Punctuate your sentences properly in the special sheet.

(5) Let every sentence in your precis be in affirmative or exclamatory sentences in a precis.

(6) Do not use direct speech in the precis. When any conversation occurs in a passage, its gist should be expressed in indirect speech.

(7) Do not reproduce quotations from the passage; do not add your own.

(8) The precis should be written in the same tense as is found in the passage. If different tenses are used in different parts of a passage, let your precis sentences also follow the same pattern.

(9) Write the precis in a single paragraph.

(10) Every precis should have a title. Identify the central theme of the passage and express it in the form of a title. Be careful in identifying the central theme. This theme (or title) should have the same scope as the passage. That is, the theme should cover all the aspects of the matter discussed in the passage and should cover no more. This requires some practice. In case of some passages, the central theme can be identified at a glance and some may call for your perspicacity.

(11) The two processes in precis-making are selection and presentation. You will have to select the important and less important. This is mainly a matter of judgment. Only practice will help you in this regard. Almost every sentence in the passage will appear to be important, since it has something to say. So it is impossible for one to present *all* the facts and ideas found in the passage in one's precis. Here and there you may be able to accommodate a few unimportant or less important matters. But if you fill up your precis indiscriminately with the facts and ideas in the precis, you will, per force, omit some important

points. So practise this selection process carefully.

A summary of the guidelines for the selection process is given below : (a) The direct relevance of any matter to the central theme of the passage is a basic criterion. (b) Intermediary conclusions and definitive opinions may be considered important. But if such conclusions are in abundance, you may take only the conclusions, ignoring the arguments adduced. Similarly, if a passage is full of definitive opinions, you will have to omit some of them. In a descriptive type of passage, you will find fact after fact in every paragraph. In such a case, you will have to drop out a large number of otherwise-relevant facts. Of course, here there can be a difference between the facts accommodated in your precis and those found in another's. You need not worry about this difference.

(12) During the stage of presentation of matter in the precis, you should avoid all unnecessary or superfluous words. There should be no repetition of ideas.

(13) Limitation of words : A passage of 300 to 750 words may be given for your precis. You may be asked to write a precis in about $\frac{1}{3}$ of the given number of words. You can assume a maximum of 10 words. Always write a few words *more*, *not less* than the number of words prescribed.

(14) *Time Schedule* : Taking into account the time allotted to the General English Paper, You will have to apportion time for different stages. We have worked out the time schedule for a total duration of one hour. If the time available for you is less, reduce the time allocated for each stage proportionately.

I Reading the passage	: 8 minutes
II Allotting the title	: 2 minutes
III Underlining and taking down the points	: 10 minutes
IV Writing the rough copy	: 20 minutes
V Pruning the rough copy	: 5 minutes
VI Fair-copying	: 15 minutes
	<hr/>
	60 minutes
	<hr/>

(15) Reading : A passage of 750 words can be read once leisurely in 8 minutes. As you read, grasp the central theme and the main ideas of the passage.

(16) *Allotting the Title* : The Title should express the central theme of the passage. An analytical title should express not only

the "subject" of discussion but also the specific aspects of the subject-matter of discussion. Normally an analytical title can be best expressed in the form of a long phrase, running into 6 to 8 words. In extreme cases, one-word titles may be appropriate. Avoid giving full sentences—even if pithy—as titles. It is pertinent to note that the scope of an apt title will be exactly the same as that of the passage.

(17) In practice, the two stages of underlining and writing down the Points can be taken together. First underline the important matter in one or more related paragraphs and, then, get down the relevant Point. This way, the entire passage should be covered. Since the Points are written only for your guidance you need not waste time trying to express the Points in elegant phrases or sentences.

(18) It is possible to write about 250 words in 20 minutes but this can be done only if one keeps on writing as a matter of course. If you pause after every word and every sentence, you will not be able to complete the work within the stipulated time. With a little practice, you should be able to write the rough copy of the precis in the required number of words. Avoid the habit of counting the number of words every now and then as you write the rough copy.

(19) You should count the number of words only after finishing the rough copy. You may take about 2 minutes for counting. Then you are to adjust the precis to bring it within the required length. This should be done quite rapidly, preferably by adding one or two sentences somewhere in the precis or by deleting a few sentences or portions of sentences, as the case may be.

(20) It is possible to fair-copy a precis of 250 words in neat hand writing in about 15 minutes. See that you create a good impression about your performance through your hand writing.

1979 I.A.S. Main Precis Passage

Write a precis of the following passage in about 225 words. As far as possible, the precis should be in your own words. It should be written on the special sheets provided, which should be fastened securely inside the answer book. State the number of words used by you at the end of the precis. N.E. Marks will be deducted if your precis is much longer or shorter.

than the length prescribed.

Work is the one thing that is necessary to keep the world going; with it we should all very quickly die.

Let us think for moment about all the kinds of work there are, and what they are for.

To begin with, many men work on the land. They are cultivators or gardner. They plough or dig and sow seeds, or else they look after cows and buffaloes, goats and sheep. They are all busy growing things or looking after animals. Without them there would be no wheat to make into flour; no hay to feed the horses on; no riece and dal; no tea to drink, no milk and ghee, and no eotton for our clothes.

Next, there are those who dig things out of the earth. They are the miners, who dig out the coal and iron, the precious stones, and gold and silver, tin, copper, lead, mica and other minerals; and the quarry men who dig out stone for buildings and roads, and for laying a bed for railway lines. Others dig up clay to make into bricks, and plates and another sort of clay to make into earthenware and plates and bowls.

Both coal and iron are needed for hundreds of different purposes, and we could not get on at all without them. Most things are made by machinery these days, and machinery is chiefly made of iron and steel. And the coal is needed not only to make the iron into machines, but very often to drive them when they were made.

Then there are those who make things. They cannot to their work till the others have theirs. Things must be either grown or dug up before anything can be made out of them. Things can also be made from leather and wool whieh come from animals. So workers of this third kind, those who make things, need the first two kinds to provide them with material before they can begin to work.

Now we come to a fourth kind of worker, who is just as useful and necessary as the other three. The things you want to eat or to wear or to use will not come to you by themselves and it would be very awkward if you had to fetch them all... Things have to be brought from the place where they are made or grown or dug up to the place where they are wanted. So, a great many men are occupied in moving thing: sailors and railwaymen, cart drivers and motor-drivers and so on.

That gives us, then, four very important kinds of workers.

We can call them, for short, the growers the diggers, the makers, and the movers.

There is still one more set of workers to talk about. Try and think of people you know do not grow or dig or make or move things, and who are workers all the same. What about the teacher, the doctor, the dentist, the policeman and the soldier, the lawyers and the priests? What is their work?

These people do not exactly make things for you, and yet you could not very well get on without them, because they do things for you that you could not do for yourself. Your teacher teaches you, the doctor cures you, the dentist looks after your teeth, the soldiers fight for you. They all do something for you that you want done and that you cannot do for yourself. It is not easy to choose a simple name to give them, but perhaps we might call them the helpers. You see that they are different from the rest because they do not provide you with things that you need; but they give you the help that you need. Some people say that what they give you is their services, which is much the same thing as help.

So you will find that every worker goes into one or other of those five sets, though it is not always easy to see just where to place him.

(about 680 words)

The central theme is: Categorization of workers in the world. So assign a suitable title expressing this theme. Then underline important portions and write down the points.

Points: (1) Work, an essential requisite for human life—different kinds of work (or workers)

Note: In the first paragraph, consisting of a single sentence, there are two parts. Either part may be taken and the other should be omitted. In the second paragraph, underline 'all the kind of work'. These two paragraphs should be considered as constituting one Point. The two ideas under this Point may be accommodated in two sentences in your precis.

(2) The first category of workers—cultivators, gardeners and cattle-rearers—their work and its importance.

Note: In the third paragraph, underline the following 'cultivators or gardeners'; 'They are all busy growing things or looking after animals'; 'Without them there would be no wheat'; 'no cotton for our clothes'. A single word 'food' or food-stuffs' will cover all the items enumerated in the paragraph i.e. wheat, hey, rice, dal, tea, milk and ghee.

(3) The second category—miners etc—the importance of coal and iron.

Note: The 4th and 5th paragraphs are covered under this Point. The minerals may not be listed in your precis, as has been done in the passage. This category of workers include miners, quarry men, brick-makers and potters. The importance of coal, iron and machinery should be mentioned in your precis.

(4) The third category—manufacturers—their work depending on the work of the first two categories.

Note: The second and the last sentence of the 6th paragraph contain one and the same idea.

(5) The fourth category—those who transport things—their work.

Note: In the lengthy second sentence of the 7th paragraph, the second part conveys the idea clearly and sufficiently and so the first part can be omitted.

(6) The last category—helpers—their work.

Note: The 8th paragraph is an intermediary summary which should be omitted. The 9th and 10th paragraph deal with the 6th Point. There is a lot of repetition in them and you should avoid repetition. In fact, nothing requires to be underlined in the 9th paragraph. In the 10th paragraph, the first and third sentences can be omitted since the basic idea in these sentences is conveyed in the fifth sentences which is important.

(7) The concluding remark contained in the last paragraph. Based on this analysis, you may write the precis in your own words. If you may write one or two sentences on each of these 7 Points you will get a good precis. A model precis of this passage is given below.

Categorization of workers in the world

Work is a basic requisite for sustaining human life on the earth. Let us discuss now the different kinds of work and the types of people who undertake these works. The first category of workers are agriculturists, gardeners and cattle-rearers who raise and look after animals. But for their work, we cannot get food or raw material for cloth. The next type of workers are miners who extract minerals of all kinds from the bowels of the earth. Quarrymen, brick-makers and potters. In the next category are those who transport things. They transport coal and iron and the machinery produced and used in the world.

supply, occupy the central place in the material life of man. They work on the materials, supplied by the first two categories of workers and on leather and wool to produce things. The next kind of work is transport i.e. movement of goods from the site of production to the place of consumption. Sailors, railwaymen, cart-drivers and motor-drivers do this work. But for them, we may find it difficult to get many things. The last category of workers are helpers like teachers, dentists, doctors and soliders who offer their indispensable specialized categories, they do not make 'things' but render help. All the workers in the world fall in one or the other category, though such categorization may be difficult in some cases. (234 words)

Note: Other suitable titles are 'kinds of work in the world' and 'Types of workers in the world'.

3

COMPREHENSION OF PASSAGES

Read the following passage carefully, and answers the questions that follow it:

Passage (1979 I.A.S. Main)

Education is not an end but a means to an end. In other words, we do not educate children only for the purpose of educating them, our purpose is to fit them for life. As soon as we realize this fact, we will understand that it is very important to choose a system of education which will really prepare children for life. It is not enough to choose the first system we find: or to continue with one's old system of education without examining it to see whether it is, in fact, suitable or not.

In many modern countries it has for some time been fashionable to think that by free education for all—whether rich or poor, clever or dull—one can solve all the problems of society and build a perfect nation. But we can easily see that free education for all is not enough: we find in such countries as have this system a far larger number of people with university degrees than there are jobs for them to do. Because of their degrees, they refuse to do what they think to be low work and, in fact working with the hands is thought to be unclear and shameful in such countries.

But we have only to think a moment to understand that the work of a completely uneducated farmer (who works with his hands) is far more important than that of a Professor: we can live without education, but we die without food. In our towns, if no one cleaned our streets and took away the rubbish from our houses, we should suffer from terrible diseases. In countries where there is no one to do such work as his job the professional and others would have to do it besides doing their own

and it would be such a waste of time for them.

Questions

- A. (i) What does the writer mean by saying that education is not an end ?
- (ii) Why do we educate children ?
- (iii) Why is it necessary to examine the system of education which we want to adopt or which we already have ?
- (iv) Why is working with the hands considered to be shameful in countries where education is free for all ?
- (v) Explain what the writer means by 'build a perfect nation'.
- (vi) What is meant by '...it has for sometime been fashionable to think...' ?
- B. In the light of the passage, state whether the following statements are true or false :
- (i) We should have a system of education which prepares children for a life of luxury.
- (ii) Free education for all will solve the problem of unemployment.
- (iii) Free education for all will teach people the dignity of working with one's hands
- (iv) The work of a farmer is far more important than the work of a professor.
- (v) Free education for all will make everyone equally intelligent and cultured.

Answers

- A. (i) 'Education is not an end'. In this sentence, 'end' is used in the sense 'aim' or 'ultimate goal'. By this sentence the author means that education by itself does not satisfy men and that people want education not for its own sake but in order to use it to achieve something else.
- (ii) We educate children to fit them for life i.e. in order to enable them to achieve great things in life or to have a good, comfortable and useful life.

- (iii) The basic aim or utility of education is to make children fit for life. If a system of education does not fulfil this objective, it is futile to have it and should be discarded in favour of a better one. So it is necessary to examine the system of education which we want to adopt or which we already have in order to find out whether the system really serves this purpose.
 - (iv) In countries where education is free for all, the number of degree-holders is greater than the number of jobs meant for degree-holders. The unemployed degree-holders refuse to do low work because they hold degrees. Any manual work is considered low in these countries. So working with hands is considered beneath one's dignity and hence shameful.
 - (v) By 'building a perfect nation' the author means 'producing such conditions in a nation that will keep it smooth-going and free from any problem'. Of course the author does not define the term 'perfect nation' but he may possibly mean 'a utopia' or 'an ideal country'.
 - (vi) By writing 'it has been for sometime been fashionable to think', the author wants to indicate that he does not subscribe to the view that follows this clause. Secondly he wants to point out that the view that follows this clause has been in vogue only for sometime i.e. acquired importance only in recent times. Thirdly he conveys the idea that those who hold this view consider themselves more enlightened and moving with times better than those who do not subscribe to this view.
- B. (i) False
(ii) False
(iii) False
(iv) True
(v) False

PASSAGE 2

Scientists tell us that without the presence of the force among the atoms that comprise this globe

would crumble to pieces and we would cease to exist and even as there is cohesive force in blind matters, so must there be in all things animate and the name for that cohesive force among animate beings is love. We have to learn to use that force among all that lives and in the use of it consists our knowledge of God. Where there is love there is life; hatred leads to destruction. Life persists in the middle of destruction. Only under that law would a well-ordered society be intelligible and life worth living.

The sum-total of the energy of mankind is not to bring us down but to lift us up, and that is the result of the definite, if unconscious, working of the law of love. The fact that mankind persists shows that the cohesive force is greater than the disruptive force, centripetal force greater than centrifugal. If love be not the law of our being, there is no escape from a periodical recurrence of war, each succeeding one out-doing the preceding in ferocity.

All the teachers that ever lived have preached this law with more or less vigour. If love was not law of life, life would not have persisted in the midst of death. Life is a perpetual triumph over the grave. If there is a fundamental distinction between man and beast, is the former's progressive recognition of the law and its application in practice to his own personal life. All the saints of the world, ancient and modern, approve of the supreme law of our being. That the brute in us seems so often to gain an easy triumph is true enough. That however does not disprove the law. It shows the difficulty of practice.

Questions

1. What do you mean by the 'cohesive force'?
2. What binds one human being with the other?
3. What does our knowledge of god consists in?
4. What enables life to persist in the midst of destruction?
5. How does hatred lead to destruction?
6. What do you understand by the 'disruptive force'?
7. What do you mean by 'centripetal force'?
8. What do you mean by centrifugal force?
9. What is the supreme law of our being?
10. If love be not the law of our being what would it lead to?

Answers

1. Cohesive force is a force which binds different particles or atoms together. Cohesion is achieved through the force of attraction.
2. Love binds one human being with the other. Although the extent of love may vary from person to person according to the nature of the relations, love is the only force general which binds human beings.
3. Our knowledge of God consists in learning to love all living things. This is not to rule out other aspects such as understanding God's omnipresence and other beliefs about God.
4. Love enables life to persist in the midst of destruction. Only because love is the law of nature, life has been able to survive in spite of large-scale destruction, that has been going on.
5. Hatred leads to destruction since it removes the binding force of love in the life of human beings.
6. 'Disruptive force' means a force which divides. It is the opposite of the binding force.
7. Centripetal force is the force which draws things towards the centre. This force is found to be more powerful than the centrifugal force which tends to drive things away from the centre.
8. Centrifugal force is the force working away from the centre. It has the tendency of making things fly away from the centre.
9. The supreme law of our being is love.
10. If love be not the law of our being, no life would exist on this planet; since life could not have existed in the midst of death.

PASSAGE 3

Democracy, a word which has come down to us from ancient Greece, means literally "the supreme power or authority of the people". and it embodies the political conception expressed by Abraham Lincoln at Gettysburg in his famous declaration that "Government of the people by the people, for the people, shall not perish from this earth". But democracy is an old

the sense in which we use it today is new. Communities of free people ruled by leaders elected at frequent intervals are not unknown in ancient history, and the most commonly quoted examples are the Roman Republics, the Greek City States. But these early instances of democracy are not really comparable with our own system, if only because all of them, sooner or later and some from the beginning were founded upon slavery, upon a gradation of political rights. Democracy in the modern sense is no more Government by a class or by a sex than it is Government by a single individual.

On the other hand, autocracy or dictatorship in the modern sense is as old in practice as it is in name. It can be proved that the course of extreme political system follows the same dangerous and disastrous lines no matter under what provocation or with what benevolent intentions they may have been started.

The history of all extreme forms of Government is practically a history of prosecution. Any government not founded upon the principle of popular control is found to resort to practices which offend modern ideas by their ferocity, their stupidity, or their triviality.

Ancient dictators thought it dangerous to allow any divergence from the official view as modern dictators think it dangerous to allow anybody to read or to have anything which does not conform to the official doctrine of the moment.

Questions

1. In whom does power reside in democracy ?
2. When did the word 'democracy' originate ?
3. In what respect are the modern democracies different from the ancient democracies ?
4. What do you mean by autocracy ?
5. What do you mean by extreme forms of Government ?
6. In what forms of Government has prosecution been a normal feature ?
7. What do the modern dictators expect from the people ?
8. Under what form of Government is popular dissent tolerated unhindered subject to law and order ?
9. Where do you find communities of the free people ruled by elected leaders in ancient times ?
10. What name would you give to a government of the people, by the people, for the people ?

Answers

1. In democracy power resides in the people. Although the power may be exercised by the council of ministers or the parliament, the ultimate source of power is the people.
2. The word 'democracy' originated during the period of ancient Greek civilisation. It is the Greeks who introduced the world democracy.
3. Democracies in early times were founded on a system of classes. In modern democracies, classes are not recognised. Besides, unlike in ancient Greece, women are not excluded from political rights in modern democracies.
4. Autocracy is a Government run by an individual according to his whims and desires.
5. In the passage the term 'extreme forms of government' refers to the governments which are run in an autocratic fashion. Although such forms are not specified in the passage, Communism, Fascism and Military Dictatorship should be considered as extreme forms of government.
6. Prosecution has been a normal feature in autocratic forms of government.
7. The modern dictators expect from their people conformity with the official doctrines and do not want the people to read or to have anything to do with the opposite views.
8. Popular dissent is tolerated unhindered, subjected to law and order, only in democracy.
9. In Rome and Greece of the ancient times, we find communities of the free people ruled by elected leaders.
10. Democracy is the name to be given to a governments of the people by the people, for the people.

PASSAGE 4

What is the purpose of poetry in modern life? Let us begin by saying what it is not obviously; the purpose is not ethical. The poet does not desire to improve the morals of his reader. The old cant of poet's "message" is now completely discredited and the history of "uplift" may be left to the unimportant

where it still flourishes. Didactic poetry is now almost universally recognized as an impertinence. The danger of poetry's becoming a kind of after-dinner amusement is far greater than the danger of its reverting to a mode of moral instruction. Literature today, is too cheap : it tends to become a sort of pleasant little hobby, something which 'nice people' play with when there is nothing more serious to do. People's minds are absorbed in commerce, science, politics ; literature has lost its prestige. We are very far from the more recent time when Lorenzo Vall's discoursing in Latin grammar disturbed the supremacy of the Popes and equally far from the more recent times when a pamphlet by Chateau-brai and reestablished at least temporarily, the dynasty of the Bourbons. Literature seems out of touch with men's lives and their real interests. And so in their popular forms, poems are something people read to amuse themselves, to beguile a tedious railway journey or to pass the long unemployed Sunday afternoon. Knowledge of modern literature even in its modern intellectual forms, and especially poetry, is an accomplishment, not a passion ; an entertainment of idle women, not a real force.

Petrarch who wept with emotion over that copy of Homer he could not read, would appear a very "ridiculous sight today. Nobody would think of becoming emotional over the possession of a mere book, an object to amuse for a few leisure hours. We do not suppose many read modern poetry for mere amusement but even here the motive is not so much a purely aesthetic enjoyment as a sort of snobbery, an outcome either of a foolish desire to know the latest fashion in poets or of an affection of superior wisdom which claims a monopoly of culture.

Questions

1. What is the true function of poetry ?
2. What do you mean by didactic poetry ?
3. What has become the purpose of poetry in modern life ?
4. What hampers the growth of true poetry and its enjoyment in modern time ?
5. What danger does the modern poetry face ?

6. Why has literature lost its prestige today ?
7. What did the Popes enjoy supremacy for ?
8. Knowledge of modern literature even in its more intellectual forms, and especially poetry, is an accomplishment not a passion. What does this expression mean ?
9. What do you mean by snobbery ?
10. What is the effect on poetry of regarding it as an accomplishment and not a passion, a means of amusement and not a real force ?

Answers :

1. The true function of poetry is to provide aesthetic enjoyment to the readers.
2. Didactic poetry means poetry which teaches us. When poems are written to convey a message or to teach morals, they will come under the category 'didactic poetry'.
3. In modern life purpose of poetry has become something like light entertainment. Poetry is expected to serve as pleasant little hobby.
4. Feverish pre-occupation with materialistic activities of life hampers the growth of true poetry and true enjoyment of poetry in modern times.
5. A danger the modern poetry faces today is that of becoming a kind of after-dinner amusement.
6. Literature has today lost its prestige since people, on account of their pre-occupations with materialistic activities, have not time to create good literature or to enjoy it.
7. The Popes enjoy supremacy for their intellectual accomplishment.
8. The given sentence means that nowadays good poems, having intellectual content, are considered a matter of personal achievement or adornment. Poetry is not considered a passion, i.e. something for which one should devote one's life whole heartedly.
9. Snobbery means affecting superiority. When a person does not have any genuine superiority he pretends to be superior.

poetry is regarded as an accomplishment and not a passion, a means of amusement and not a real force, poetry loses depth and profundity. In other words, poetry becomes shallow.

the following passages and mark the correct response questions under them.

PASSAGE 5

The word 'adventure' embraces a company of great words, including courage, tenacity, selflessness and faith, but its most important ingredient cannot be expressed in one word; it is the spirit that urges men to volunteer to undertake hazardous tasks, for adventure implies the readiness and desire to embark on a course of action that entails risk. A young child may display an instinct for adventure by climbing out of his play-pen to explore the mysteries of the nursery, but this kind of adventure is hardly laudable because the child has no yet sufficient reasoning power to realize the potential risk in such an action. As we grow older, however, the spirit of adventure tends to be restrained by caution; the fire is often smothered by reason, which gives warning of impending dangers and coldly counsels safety first. Yet in some men the urge for adventure may be so strong that it overwhelms the primary instinct of self-preservation and inspires them to attempt the impossible, to reach out for the unattainable.

To evoke our admiration adventure need not be successful; it is enough if the adventure, is impelled by courage. Indeed, the failure of a gallant enterprise often touches our hearts even more than its success. Scott's tragic failure excited our imagination and drew our applause more richly than any success could have done, and the vision of Mallory and Irvine toiling immortally through the swirling mists up towards the summit of Everest, never to return, inspired us more than if they had gained their objective and returned in triumph to tell their story. Success in dangerous enterprises often brings material rewards, but a glorious failure that inspires those who afterwards bring a greater honour than any material reward. It was said of Mallory that "a fire burnt in him that his willing spirit to rise superior to the weakness of his

Yes it would be a fallacy to assume that the conquest of the flesh is easier for such adventurers than for us humbler mortals. There has never been a man who knew no fear, but the finer the courage of a man, the less will he betray his fears. When we imagine that men who deliberately set out on a perilous adventure are endowed with a disregard for danger, let us remember that their bodies are sensible of the same pains as ours and that their minds suffer the same anxieties. What they have that we lack is the ability to call up some impelling force from within that we all possess but that lies dormant in most of us, although we admire its manifestation in this power the individual must fight gigantic battles within himself : reason, hunger, love of life, the insistent call of home—all these present vast obstacles which he must surmount and which yet roar up before him inexorably again and again.

Questions and Answers

1. What is needed in an adventure in order to evoke our admiration ?
 - (a) success
 - (b) gigantic nature
 - (c) courage of the adventurer
 - (d) a lot of self-sacrifice.

Ans : (c)

2. Is it reasonable to assume that adventurers are able to conquer their fears easily?
 - (a) no
 - (b) yes
 - (c) not known

Ans : (b)

3. Which is a primary instinct in man?
 - (a) goodness
 - (b) spirit of adventure
 - (c) reason
 - (d) self-preservation

Ans : (d)

4. What is it that the adventurers have and we lack?
 - (a) the power of the spirit to stifle self
 - (b) good physique
 - (c) the spirit of sacrifice

(d) temperance in everything.

Ans : (a)

5. Why can't we admire the child's climbing out of his play-pen?

(a) the child may endanger its life

(b) it is a foolish act

(c) the child has no reasoning power to realize the potential risks

(d) the child may develop into a ruffish.

Ans : (c)

6. What is the fire that burned in Mallory?

(a) a willing spirit that rose superior to the weakness of his flesh

(b) tenacity

(c) faith

(d) spirit of adventure.

Ans : (d)

7. What does reason generally do?

(a) it prohibits all adventures

(b) it encourages adventures to some extent

(c) it advises that safety should be the first concern of a man

(d) it prevents a man from attempting the impossible.

Ans : (c)

8. When will failure excite our imagination more than success does?

(a) when the failure is tragic

(b) when the person concerned is impelled by courage

(c) when the failure is a stopping stone to success

(d) when the failure is beyond our control.

Ans : (a)

9. As we grow older, what happens?

(a) we become hard realists

(b) we lose the spirit of adventure wholly

(c) our spirit of adventure is restrained by caution

(d) we become indifferent to success and failures.

Ans : (c)

10. Does success in a dangerous enterprise always bring material rewards?

(a) yes

(b) no

(c) not always

(d) not known.

Ans : (b)

PASSAGE 6

The voice had to be listened to not only on account of the form but for the matter which it delivered. It gave a message to the country that it needed greatly. It brought to the common people a realization of their duty to concern themselves with their affairs. The common people were made to take an interest in the matter in which they were governed, in the taxes they paid, in the return they got from those taxes. This interest in public affairs—politics was not to be the concern of a small aristocracy of intellect or property politics was to be no longer the monopoly of the classes but the property of the masses. And with the change in the subjects of politics that voice brought about also a change in the subject of politics. Till then politics had busied itself mainly with the machinery of government towards making its personnel more and more native, with proposals for a better distribution of political power, with protests against the sins of omission and of commission of the administration. That voice switched politics on to concern for the needs of the common people. The improvement of the lot of the poor was to be the main concern of politics and the politician. The improvement, especially of the lives of the people of the neglected villages, was to be placed before governments and political organizations as the goal of all political endeavour. The raising of the standard of living of the people of the villages, the finding of the subsidiary occupations which would give the agricultural poor work for their enforced leisure during the off season and an addition to the sanitation of the villages—these were to be the objectives to be kept in view. In the towns, the slums and cheries were to receive especial attention.

Questions and Answers

1. What was one of the objects of politics before the voice came ?
 - (a) economic liberation of the poor
 - (b) protects against the sins of administration

- (c) national independence
- (d) pursuit of truth.

Ans : (b)

2. Who practised politics before the voice came ?
- (a) a small aristocracy of intellect or property
 - (b) all property-holders
 - (c) a few intellectuals
 - (d) the masses

Ans : (a)

3. One of the objectives to be kept in view now is
- (a) economic equality
 - (b) the goals of the Five Year Plans
 - (c) improvement of the housing of the poor
 - (d) all of them.

Ans : (d)

4. Was politics once the monopoly of certain classes?
- (a) yes
 - (b) no
 - (c) not known

Ans : (a)

5. What was the matter which the voice delivered?
- (a) that people should take up arms to fight for independence
 - (b) that all economic disparities should be ended
 - (c) that the common people should take interest in the manner in which their taxes were utilised
 - (d) that the caste system should be eradicated

Ans : (c)

6. What do you understand by the word 'cherries' ?
- (a) the localities where the lower-income groups lived
 - (b) the localities where the harijans lived
 - (c) slums
 - (d) the residential areas of the poor people

Ans : (b)

7. What was to be the goal of all political endeavour ?
- (a) the safety of the politicians
 - (b) the independence of the country
 - (c) the improvement of the lives of the people of villages
 - (d) to fight against imperialism on one hand and against communism on the other.

Ans : (c)

1. What is this voice ?

- (a) the voice of our conscience
- (b) the voice of Mother India
- (c) Mahatma Gandhi
- (d) Abraham Lincon

Ans : (c)

9. Why should people take an interest in politics ?

- (a) that is the only way by which they can derive the maximum advantage from the political system.
- (b) they should liberate their country
- (c) otherwise the politicians will be come all powerful
- (d) politics was their property.

Ans : (d)

10. Why should have the people listened to the voice ?

- (a) since it fought for truth
- (b) since the matter of the message was a great importance to them
- (c) since there was no other source of advice
- (d) since the voice came from a great man.

Ans : (b)

PART X

GENERAL MENTAL ABILITY
TESTS

GENERAL MENTAL ABILITY TESTS

The U.P.S.C. uses the term 'General Mental Ability Tests' to cover a range of questions of the objective type which have to be answered by the candidate using his mental traits, not connected with the knowledge of subjects like Sciences, History, Geography and Current Affairs which are, otherwise, prescribed as parts of General Studies. It is really difficult to justify the nomenclature since mental ability is, no doubt, required to answer questions in the other Parts of General Studies also. In the ultimate analysis, the essential mental faculties of memory (knowledge), understanding and intelligence do find enough scope, in varying proportions, in the study of different subjects. 'General Mental Ability Tests' is no exception. But it is for all to see that the range of questions which go by the name 'General Mental Ability Tests' can be easily and definitely differentiated from the rest of the questions in a General Studies Paper of the U.P.S.C. So, let us be concerned with the content of 'General Mental Ability Tests' rather than with its definition. The questions under this head fall into several categories—Elementary Mathematics (Arithmetic and Geometry); Logic; Intelligence Tests; Statistical Analysis of Tables, Graphs and Diagrams. Other Recruiting Agencies and Entrance Selection Bodies also make use of all these tests and some others such as Aptitude Tests, Psychological Tests etc.

In the following Chapters we propose to acquaint the candidate with some general instructions and model questions and answers relating to different categories of General Mental Ability Tests. The candidates should note that a thorough preparation to take care of all possible questions can never be made. In any Examination, some of the General Mental Ability Tests will be very easy; some, of the standard type; and a few, really difficult. A sensible candidate will not

10.4

pursue these out of-the-way questions (something like the mirage) at much expense of effort and time. We have accommodated the standard types of problems and have provided enough exercises for practice.

At the outset we may point out that a good familiarity with Elementary Mathematics and a sound common sense coupled with acute understanding will be valuable assets to a candidate in tackling these problems. Time is an important factor with regard to General Mental Ability Tests. If you take half of an hour to solve one problem, your work will be out to be futile. So, you will have to cultivate the time while attempting these questions. At the same time, it is not wise to use rushing through to get the wrong answer. Particularly in the U.P.S.C Civil Services Preliminary Examination, paucity of time is not a normal problem. So, be alert and attentive. In the case of some of the Bank Examinations where the allotted time is insufficient or the bare minimum time for the Intelligence Test and Arithmetic Papers, the candidate will have to work with acute time sense.

Intelligence Tests

Intelligence of a candidate can be tested in ever so many ways. In a Written Examination of the Objective Type, intelligence, as distinct from and not depending on subject-oriented knowledge, is sought to be tested through numerous standard types of questions. The Intelligence Tests are not to be confused with what are known as Intelligence Quotient (I.Q.) tests or Quiz Contests. Although it is not possible to streamline all the probable questions into clear categories, we have devised the following 19 Exercises so as to impart to candidates some systematic familiarity with the major types of Intelligence Tests.

The first 4 Exercises are based on Relationships of related items. These are among the simplest types of Intelligence Tests. The only problem may be the unfamiliarity of certain words used in the responses. The candidate should take into account the dominant relationship rather than trivial relationships in order to identify and isolate the oddman (stranger). Exercises V to VIII fall in the category of 'Law of Number'. The formation of different elementary series of numbers such as natural numbers, odd numbers, even numbers, series of multiples, series of prime numbers, series of squares, series of cubes, arithmetic progressions, geometric progressions and their combinations should be known to the candidate. In Exercise VII, artificial meanings are assigned to arithmetic notations and positions. Exercises IX to XV are based on vocabulary and the law of numbers as applied to alphabet letters. You have to be fairly informed on the words which are used for this type of exercise. The exercises are designed to impart to you some familiarity with the positions of the

alphabet letters. You have to read the instructions carefully and carry out the operations involved, one by one, generally from the rear, without getting overwhelmed by the totality of instructions. Exercise XVI deals with blood relationships. Problems in Exercise XVII relate to distances and directions. Learn the method of drawing diagrams, as illustrated in the Answers. The only formula involved in these problems is the Pythagoras Theorem. Exercise XVIII tests the candidate's familiarity with the working out of days, dates and time. The last Exercise deals with 'confusing instructions'. You are expected to carry out the instructions coolly and carefully.

EXERCISE I

Instruction : *Spot out the stranger*

- | | |
|--------------------------|------------------------|
| 1. (a) Planet | (b) Satellite |
| (c) Star | (d) Sky |
| 2. (a) Apology ✓ | (b) Sociology |
| (c) Geology | (d) Zoology |
| 3. (a) Carpenter | (b) Table |
| (c) Tailor | (d) Engineer |
| 4. (a) Herd | (b) Class |
| (c) Score | (d) Student |
| 5. (a) Blue | (b) Green |
| (c) White | (d) Orange |
| 6. (a) Boot | (b) Cap |
| (c) Socks | (d) Slippers |
| 7. (a) Gramophone | (b) Tape-recorder |
| (c) Harmonium | (d) Transistor |
| 8. (a) Spanner | (b) Horn |
| (c) Screw-driver | (d) Chisel |
| 9. (a) Delhi | (b) Kanpur |
| (c) Ganges | (d) Lucknow |
| 10. (a) Cabbage | (b) Brinjal |
| (c) Mango | (d) Onion |
| 11. (a) Trouser | (b) Shirt |
| (c) Comb | (d) Turban |
| 12. (a) Bayonet | (b) Sword |
| (c) Dagger | (d) Pistol |
| 13. (a) Wool | (b) Cotton |

- | | | |
|-----|----------------|----------------|
| | (c) Terelyne | (d) Silk |
| 14. | (a) Lizard | (b) Crab |
| | (c) Frog | (d) Chameleon |
| 15. | (a) Bicycle | (b) Scooter |
| | (c) Couch | (d) Train |
| 16. | (a) Ram | (b) Shyam |
| | (c) Suresh | (d) Captain |
| 17. | (a) Yellow | (b) Red |
| | (c) Shining | (d) Green |
| 18. | (a) Books | (b) Pen |
| | (c) Paper | (d) Knife |
| 19. | (a) Ounce | (b) Pint |
| | (c) Drachma | (d) Minimum |
| 20. | (a) Bold | (b) Dashing |
| | (c) Confident | (d) Bashful |
| 21. | (a) Pain | (b) Relief |
| | (c) Agony | (d) Weep |
| 22. | (a) Crime | (b) Sin |
| | (c) Morality | (d) Mistake |
| 23. | (a) Cart | (b) Aeroplane |
| | (c) Scooter | (d) Motorcar |
| 24. | (a) Empty | (b) Occupied |
| | (c) Unfilled | (d) Vacuum |
| 25. | (a) Abundance | (b) Plenty |
| | (c) Sufficient | (d) Shortage |
| 26. | (a) Love | (b) Affection |
| | (c) Patience | (d) Attraction |

Answers

1. Ans. (d) Planet, satellite and star are material heavenly bodies whereas sky is only an optical illusion.
2. Ans. (a)
3. Ans. (b)
4. Ans. (d) 'student' is singular whereas the other are plural or groups.
5. Ans. (c) White is a composite colour whereas the others are primary colours.

7. Ans. (c) Harmonium produces original sound. Others reproduce recorded sound.
8. Ans. (b) 9. Ans. (c)
10. Ans. (c) Mango is the fruit of a tree whereas the others are vegetables of plants.
11. Ans. (c) Note : Read (d) as 'Turban'
12. Ans. (d) Pistol can be used to attack from a distance. The others can be used only in close contact.
13. Ans. (c)
14. Ans. (b) Crab belongs to one family of animals whereas the other three belong to another.
15. Ans. (c) 16. Ans. (d) 17. Ans. (c)
18. Ans. (d) you should not pick out 'Books' as the oddman on the ground that it is plural.
19. Ans. (d) Here one may not be quite sure of one's answer. We choose (d) as the answer on the ground that 'Minimum' is abstract and indefinite whereas ounce, pint and drachma are definite units. Some may choose 'drachma (currency of Greece)' as the answer on the ground that it is a definite material body whereas others are only abstractions.
20. Ans. (d) 21. Ans. (b) 22. Ans. (c)
23. Ans. (b) Here there may be a genuine doubt regarding the correct answer. Aeroplane is differentiated from the other three on the ground that it moves above the ground level. Some may be inclined to choose (a) 'cart' as the answer on the ground that it is not powered. Whereas the others are powered or power-driven. However there can be power-driven carts also.
24. Ans. (b) 25. Ans. (d) 26. Ans. (c)

EXERCISE II

Instruction : Find out the oddman

1. (a) School and Student (b) Pen and ink
(c) Garden and Canteen (d) Library and books

- | | |
|----------------------------|-------------------------|
| 2. (a) Uncle and nephew | (b) Mother and Sister |
| (c) Aunt and niece | (d) Father and son |
| 3. (a) Open and close | (b) Hate and dislike |
| (c) Rise and fall | (d) Go and come |
| 4. (a) Cycle and scooter | (b) Rifle and sword |
| (c) Pencil and pen | (d) Shirt and tailor |
| 5. (a) River and boat | (b) Bulb and light |
| (c) Watch and time | (d) Chimney and smoke |
| 6. (a) Apricot and melon | (b) Chisel and hammer |
| (c) Coat and table | (d) Husband and Wife |
| 7. (a) Quiet and idle | (b) Public and private |
| (c) Odd and even | (d) Urban and rural |
| 8. (a) Tall and huge | (b) Slim and thin |
| (c) Intelligent and clever | (d) Straight and curved |
| 9. (a) Day and night | (b) Do and work |
| (c) Easy and difficult | (d) Work and play |
| 10. (a) West and South | (b) Short and long |
| (c) Hard and Soft | (d) Hot and cold |

Answers

In this exercise, you find 4 pairs given in the responses to each question. The items of each of 3 pairs have one sort of relations between them whereas the items of the fourth pair will not have the same type of relations between them. This pair should be identified and given out as the answer to the question.

1. Ans. (c) The relations between school and student ; pen and ink ; and library and book are quite clear and well-known. But there is no immediate relationship between garden and canteen.
2. Ans. (b) 3. Ans. (b) 4. Ans. (d)
5. Ans. (a) Bulb is meant for light ; watch is meant for time ; chimney is meant for smoke. But river is not meant for boat or vice versa.
6. Ans. (c) Coat and table are not similar items ; others are similar items ;
7. Ans. (c) 'Quiet and idle' are similar things whereas the other pairs contain opposite things.

8. Ans. (d)
9. Ans. (b) 'Do and work'
10. Ans. (a) 'West and South' are not opposite directions.

EXERCISE III

Instruction : Choose the most appropriate response to fill in the blanks.

1. Prison is to humans as cage is to———
 (a) Sparrow (b) Parrot
 (c) Birds (d) Iron
2. Limb is to body as branch is to———
 (a) Seed (b) Tree
 (c) Wood (d) Mind
3. Uncle is to Aunt as cock is to———
 (a) Fowl (b) Chicken
 (c) Hen (d) Duck
4. A Bear is to cub as cow is to———
 (a) Calf (b) Kid
 (c) Fawn (d) Mare
5. Wood is to table as——— is to coat.
 (a) Shirt (b) Wear
 (c) Trouser (d) Cloth
6. Health is to sickness as happiness is to———
 (a) Medicine (b) Misery
 (c) Treatment (d) Cure
7. Refrigerator is to cool as oven is to———
 (a) Warm (b) Cook
 (c) Heat (d) Use
8. Work is to relax as obey is to———
 (a) Disobey (b) Discipline
 (c) Behave (d) Quarrel
9. Boy is to girl as Nephew is to———
 (a) Uncle (b) Aunt
 (c) Brother-in-law (d) Niece
10. Fair is to Fare as Hair is to———
 (a) Rabbit (b) Mouse
 (c) Hare (d) Ticket

11. Boot is to lace as waist-coat is to——
(a) Button (b) Coat
(c) Pocket (d) Jacket
12. Doctor is to patient as teacher is to——
(a) School (b) Learning
(c) Student (d) People
13. House is to rent as——is to interest.
(a) Work (b) Capital
(c) Manager (d) Enterprise
14. Book is to illiteracy as Medicine is to——
(a) Beauty (b) Cure
(c) Health (d) Disease
15. Maximum is to minimum as——is to stale
(a) Good (b) Reasonable
(c) Fresh (d) New
16. Sand is to stand as say is to——
(a) Tell (b) Spray
(c) Ask (d) Stay
17. Law is to lawyer as politics is to——
(a) Administrator (b) Leader
(c) Politician (d) Minister
18. Scientist is to laboratory as Doctor is to——
(a) Clinic (b) Medicine
(c) Patient (d) Disease
19. Learn is to literate as own is to——
(a) Possess (b) Rich
(c) Knowledge (d) Property
20. Sun is to candle as——is to tank.
(a) Ocean (b) Fish
(c) Water (d) River
21. Time is to watch as pressure is to——
(a) Feel (b) Hygrometer
(c) Barometer (d) Puch
22. Gold is to wood as——is to carpenter
(a) Ornament (b) Goldsmith
(c) Jeweller (d) Table

- carpenter is to wood as tailor is to _____
- (a) Shirt (b) Coat
(c) Cloth (d) Wear
- Beef is to Hindus as _____ is to Muslims.
- (a) Mutton (b) Pork
(c) Fish (d) Pig
- Oil is to stove as wax is to _____
- (a) Candle (b) Light
(c) Wicks (d) Bees
26. Flower is to butterfly as dirt is to _____
- (a) Mosquito (b) Fly
(c) Bug (d) Rat
27. Handsome is to Beautiful as _____ is to she
- (a) Charming (b) Man
(c) He (d) Woman
28. England is to Europe as Japan is to _____
- (a) U.N. (b) World
(c) Asia (d) Far East
29. But is to Tub as Mar is to _____
- (a) Ram (b) Spoil
(c) Mat (d) Mare
30. $\frac{1}{2}$ is to forty-five as _____ is to thirty
- (a) $\frac{3}{4}$ (b) $\frac{1}{4}$
(c) $\frac{1}{3}$ (d) $45\frac{1}{2}$
31. Five is to seven as fifteen is to _____
- (a) 21 (b) 14
(c) 17 (d) 12
32. Pin is to nip as pat is to _____
- (a) Pip (b) Tap
(c) Tin (d) Pen

Answers

In this exercise, proportionate relationships are considered. The relationship between the items of a pair given. You have to point out the item that will have the same type of relationship with the third item given.

1. Ans. (c) Cage is having the same type of relationship to sparrow, parrot and birds as prison

human beings. So, in a sense, all the three responses will fit into the sentence. But we have to choose the best possible answer. So we choose 'birds' which is comprehensive and includes the other two responses.

2. Ans. (b) 3. Ans. (c) 4. Ans. (a) 5. Ans. (d) 6. Ans. (b) 7. Ans. (c) 8. Ans. (a) 9. Ans. (d) 10. Ans. (c)

Here the relationship between the items of each pair is based only on the English spelling of words (pronunciation).

11. Ans. (a) 12. (c) 13. Ans. (b) 14. Ans. (d) 15. Ans. (c) 16. Ans. (d) 17. Ans (c) 18. Ans. (a) 19. Ans. (b) 20. Ans. (a) Ocean.

21. Ans. (c) 22. Ans. (b) 23. Ans. (c) 24. Ans. (b) 25. Ans. (a) 26. Ans. (b) 27. Ans. (c) 28. Ans. (c) 29. Ans. (a) The letters in 'but' are reversed to get 'tub' The same way, 'mar' will give 'ram'.

30. Ans. (c) $\frac{1}{2} \div 45 = 1/90$. $1/3 \div -30 = 1/80$.

31. Ans. (a) $5/7 = 15/21$. Some may choose (c) 17 as the Answer on the ground that seventeen is formed from seven the same way as fifteen is formed from five. But arithmetic formulation takes precedence over the alphabetical formulation.

32. Ans. (b)

EXERCISE IV

Instruction : Choose the pair, the items of which bear the same relationship between them as the relationship between the items of the pair, given at the top of each question.

1. Yarn and fabric
 - (a) Paper and book
 - (b) Wood and box
 - (c) Cloth and coat
 - (d) Pulp and paper
2. Physics and Science
 - (a) Drawing and painting
 - (b) Sketching and printing
 - (c) Painting and art
 - (d) Medicine and Doctor
3. Crush and Juice
 - (a) Push & Pull
 - (b) Stretch and release
 - (c) Bend and break
 - (d) Boil and vapour

Premier Competition

- carpenter is to wood as tailor is to _____
- (a) Shirt
(b) Coat
(c) Cloth
(d) Wear
- Beef is to Hindus as _____ is to Muslims.
- (a) Mutton
(b) Pork
(c) Fish
(d) Pig
- Oil is to stove as wax is to _____
- (a) Candle
(b) Light
(c) Wicks
(d) Bees
26. Flower is to butterfly as dirt is to _____
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- (a) $\frac{3}{4}$
(b) $\frac{1}{4}$
(c) $\frac{1}{3}$
(d) $\frac{45}{2}$
31. Five is to seven as fifteen is to _____
- (a) 21
(b) 14
(c) 17
(d) 12
32. Pin is to nip as pat is to _____
- (a) Pip
(b) Tap
(c) Tin
(d) Pen

Answers

In this exercise, proportionate relationships are considered. The relationship between the items of a given. You have to point out the item that will have same type of relationship with the third item given.

1. Ans. (c) Cage is having the same type of ship to sparrow, parrot and birds as prison

human beings. So, in a sense, all the three responses will fit into the sentence. But we have to choose the best possible answer. So we choose 'birds' which is comprehensive and includes the other two responses.

2. Ans. (b) 3. Ans. (c) 4. Ans. (a) 5. Ans. (d) 6. Ans. (b) 7. Ans. (c) 8. Ans. (a) 9. Ans. (d) 10. Ans. (c)

Here the relationship between the items of each pair is based only on the English spelling of words (pronunciation).

11. Ans. (a) 12. (c) 13. Ans. (b) 14. Ans. (d) 15. Ans. (c) 16. Ans. (d) 17. Ans (c) 18. Ans. (a) 19. Ans. (b) 20. Ans. (a) Ocean.

8. Ans. (c) Just as Reason is associated with logician, wisdom is associated with sage. Truth need not be associated with philosopher.

EXERCISE V

Instruction : Write the next number in the series :

1. 10, 3, 7, 4, 4, 5,.....
2. 8, 4, 12, 4, 16, 4,.....
3. 5, 10, 17, 26, 37,.....
4. 9, 10, 8, 11, 7, 12, 6, 13,.....
5. 21, 28, 42, 63,.....
6. 27, 64, 125, 216,.....
7. 5, 8, 16, 19, 38, 41, 82...
8. 1, 4, 9, 16, 25, ...
9. 34, 18, 10, 6, 4,.....
10. 3, 5, 9, 17, 33,.....
11. 2, 3, 4, 4, 5, 6, 6, 7, 8, 8, 9,.....
12. 3, 5, 10, 12, 24, 26,.....
13. 5, 13, 11, 16, 16, 20, 20, 25,.....
14. 1, 3, 9, 27,.....
15. 2, 5, 11, 23, 47,.....
16. 7, 10, 20, 23, 46,.....
17. 54, 52, 49, 45, 40, 34,.....
18. 2, 3, 6, 4, 24, 5, 120,.....
19. 9, 8, 7, 6, 6, 5, 4, 3, 3,.....
20. 31, 29, 30, 28, 29,.....

Answers :

1. Ans. 1. The given series actually consists of two series i.e. 10, 7, 4,and 3, 4, 5,.....

To get the required next number we have to take into account the first series only. It is clearly an arithmetic progression with common difference (-3) i.e. each term is got by subtracting 3 from the preceding terms. So the next number of the series is 1.

Note. The standard form of an arithmetic progression is $a, a+d, a+2d, a+3d$.

2. Ans. 20.

Premier
 50. The difference between two terms of the series goes on increasing by 2.

$$\begin{array}{ccccccc} 5 & \rightarrow & 10 & \rightarrow & 17 & \rightarrow & 26 & \rightarrow & 37 & \rightarrow & 50 \\ 5 & & 7 & & 9 & & 11 & & 13 & & \end{array}$$

Ans. 5. There are two series in the given series. We have to consider the first i.e. 9.8.7.6.5.

Ans. 91. The differences between terms form the series 7, 14, 21, 28.

Ans. 343. The given series is a series of cubes 3, 4, 5, 6, 7.

Ans. 85. There are two methods of getting the answer. Considering the given series as a single series,

$$\begin{array}{ccccccc} 5 & \rightarrow & 8 & \rightarrow & 16 & \rightarrow & 19 & \rightarrow & 38 & \rightarrow & 41 & \rightarrow & 82 & \rightarrow & 85 \\ +3 & & \times 2 & & +3 & & \times 2 & & +3 & & \times 2 & & +3 & & \end{array}$$

Considering the given series as double, take into account the second series 8, 10, 41 with differences 11, 22, 44 etc.

8. Ans. (36).

9. Ans. 3. The differences of the terms form a geometrical series.

$$\begin{array}{ccccccc} 34 & \rightarrow & 18 & \rightarrow & 10 & \rightarrow & 6 & \rightarrow & 4 & \rightarrow & 3 \\ 16 & & 8 & & 4 & & 2 & & 1 & & \end{array}$$

Note : 16, 8, 4, 2, 1 form a geometrical series with common ratio $\frac{1}{2}$. The standard form of a geometric progression is $a, ar, ar^2, ar^3, ar^4, \dots$

10. Ans, 65

11. Ans. 12. In the given series, all natural numbers are enumerated, prime numbers once and composite numbers twice.

Prime Numbers : 2, 3, 5, 7, 11
 Composite numbers : Others.

Note : A prime number should not be divisible by any other whole number.

12. Ans. 52. Do this the same way as Qn. 7.

13. Ans. 23. Consider the first series 5, 11, 16, 20, ...
 The difference goes on decreasing by unity (one)

14. Ans. 81. This series is a geometrical progression with common ratio. 3.
15. Ans. 95. Differences form a geometric series 3, 6, 12, ...
16. Ans. 49. Follow the method used for Q n. (7).
17. Ans. 27. The negative differences go on increasing.
18. Ans. 6. Consider the simple second series 3, 4, 5, 6.
19. Ans. 2. Consider the series as consisting of two series and take the second series.

$$\begin{array}{ccccccc} 8 & \rightarrow & 6 & \rightarrow & 5 & \rightarrow & 3 & \rightarrow & 2 \\ & & 2 & & 1 & & 2 & & 1 \end{array}$$

The differences are alternately 2, 1, 2, 1.

20. Ans. 27.

EXERCISE VI

Instruction : Spot out the stranger ;

1. 2, 4, 8, 15, 32
2. 1, 8, 26, 64, 125
3. 7, 21, 29, 49, 105
4. 7, 13, 5, 16, 19, 23
5. 49, 1, 5, 25, 16
6. 12, 18, 22, 25, 16, 26
7. 3, 9, 18, 20, 27, 36
8. 25, 9, 13, 16, 11, 87
9. 25, 27, 23, 30, 20, 33, 19, 36
10. 16, 1, 81, 250, 625
11. 12, 15, 18, 20, 24, 27
12. 1, 4, 10, 16, 25, 36
13. 39, 52, 60, 104, 156
14. 43, 44, 49, 46, 47, 48
15. 8, 9, 11, 10, 14, 10, 15, 13

Answers :

One of the numbers in each series will not fit into a regular series. That number should be considered the stranger.

1. Ans. 15. This number may be considered the stranger on the ground that it is odd. Also, in its place, 16 should be there to make the series regular.

2. Ans. 26. Others are cubes of natural numbers.
3. Ans. 29. Others are multiples of seven.
4. Ans. 16. Other are odd numbers.
5. Ans. 5. Others are squares of natural numbers
6. Ans. 25. Others are even numbers.
7. Ans. 20. others are multiples of three
8. Ans. 16. Others are odd numbers
9. Ans. 20. Assume that there are two regular arithmetic series. The first series 25, 23, 20, 19 is defective, because 21 should be there is the place of 20. The second series 27, 30, 33, 36 is regular.
10. Ans. 250. Others are squares.
11. Ans. 20. If 21 were there in the place of 20, the given series would be a regular arithmetic progression with common difference 3.
12. Ans. 10. Others are squares.
13. Ans. 60. Others are multiples of 13.
14. Ans. 49. If 45 had been in the place of 49, the given series would be a regular arithmetic series.
15. Ans. 10. Of all the given numbers, only 10 is repeated.

EXERCISE VII

Instruction : Choose the response which provides answer in the following :

1. If $64 \times 34 = 32$, $84 \times 42 = 41$, $64 \times 46 = 33$, then $26 \times 36 = ?$
 - (a) 23
 - (b) 13
 - (c) 33
 - (d) 31.
2. If $34 + 35 = 15$, $55 + 86 = 24$, $78 + 19 = 25$, then $24 + 24 = ?$
 - (a) 48
 - (b) 24
 - (c) 12
 - (d) 40.
3. If $6 \times 2 = 31$, $8 \times 4 = 42$, $2 \times 2 = 11$, $6 \times 6 = 33$ then $8 \times 6 = ?$
 - (a) 34
 - (b) 43
 - (c) 14
 - (d) 40.

4. If $2 \times 8 = 4$, $3 \times 15 = 5$, $4 \times 24 = 6$, then $5 \times 40 = ?$
(a) 10 (b) 8
(c) 6 (d) 15.
5. If $1 \times 2 \times 3 = 312$, $2 \times 3 \times 4 = 423$, $3 \times 2 \times 4 = 432$ then $2 \times 4 \times 3 = ?$
(a) 423 (b) 234
(c) 324.
6. If $20 \times 3 = 20$, $31 \times 6 = 62$, $25 \times 9 = 75$, then $40 \times 12 = ?$
(a) 160 (b) 40
(c) 80 (d) 125
7. If $4 + 3 = 10$, $5 + 4 = 13$, $6 + 5 = 16$, then $7 + 6 = ?$
(a) 17 (b) 52
(c) 19 (d) 5
8. If $3 \times 4 = 916$, $2 \times 5 = 425$, $1 \times 7 = 149$, then $4 \times 5 = ?$
(a) 232 (b) 1625
(c) 525 (d) 1078
9. If $8 \div 6 = 1$, $20 \div 6 = 7$, $100 \div 8 = 46$, then $55 \div 5 = ?$
(a) 25 (b) 35
(c) 45 (d) 55
10. If $8 \times 6 = 43$, $6 \times 4 = 32$, $2 \times 4 = 12$, then $4 \times 8 = ?$
(a) 32 (b) 16
(c) 24 (d) 48
11. If $5 \times 71 = 40$, $92 \times 23 = 55$, $37 \times 44 = 80$, then $54 \times 32 = ?$
(a) 17 (b) 54
(c) 100 (d) 45
12. If $4 \times 1 = 28$, $2 \times 3 = 64$, $1 \times 0 = 63$, $2 \times 4 = 84$, then, $4 \times 3 = ?$
(a) 34 (b) 40
(c) 60 (d) 86
13. If $12 \times 23 = 3221$, $36 \times 13 = 3163$, $82 \times 15 = 5128$ then $52 \times 37 = ?$
(a) 3742 (b) 7325
(c) 2473 (d) 1473
14. If $32 + 16 = 21$, $36 + 12 = 31$, $45 + 15 = 31$, then $90 + 18 = ?$
(a) 15 (b) 3
(c) 51 (d) 16

15. If $15 \div 3 = 51$; $27 \div 6 = 92$; $18 \div 9 = 63$ then
 $21 \div 12 = ?$
 (a) 74 (b) 28
 (c) 49 (d) 11

Answers

In this exercise the arithmetic notations like \times , $+$, $-$, \div , $=$ etc. carry artificial meanings. So from the given set we have to find out this artificial meaning and then apply the same meaning to get the answer.

- Ans. (b) Taking the second digit number of the first number in $64 \times 34 = 32$, i.e. 6 and the first digit number of the second number i.e. 4 we get 64. Half of this number gives 32. The same way the other 'equations' are also formed. To get the answer, we take 2 from 26 and 6 from 36 and write 26 and then divide it by 2.
- Ans. (c) $34 + 35 = 15$ means $3 + 4 + 3 + 5 = 15$.
The same way, $24 + 24 = 2 + 4 + 2 + 4 = 12$,
- Ans. (b). From 6×2 we form 62. Divide this by 2 to get 32. The same way 8×6 gives $86 \div 2 = 43$.
- Ans. (b) $2 \times 8 = 4$ means $8 \div 2 = 4$. The same way 5×40 means $40 \div 5 = 8$.
- Ans. (c)
- Ans. (a) $20 \times 3 = 20$ means $20 \times 3 / 3 = 20$.
 $31 \times 6 = 62$ means $31 \times 6 / 3 = 31 \times 2 = 62$.
 Similarly $40 \times 12 = 40 \times 12 / 3 = 40 \times 4 = 160$.
- Ans. (c) $4 + 3 = 10$ means $4 + 3 \times 2 = 10$.
 $5 + 4 = 13$ means $5 + 4 \times 2 = 13$
 Similarly $7 + 6 = 7 + 6 \times 2 = 19$.
- Ans. (b) $3 \times 4 = 916$ means $3^2 + 4^2$ i.e. 916.
 Similarly $4 \times 5 = 4^2 + 5^2 = 1625$
- Ans. (a) $8 \div 6 = 1$ means $\frac{8-6}{2} = 1$.
 Similarly $55 \div 5 =$ means $\frac{55-5}{2} = 25$.
- Ans. (c) same as Qn. (3).

11. Ans. (d) $5 \times 71 = 40$ means $5 \times (7 + 1) = 40$
 $92 \times 23 = 55$ means $(9 + 2) \times (2 + 3) = 55$.
 Similarly 54×32 means $(5 + 4) \times (3 + 2) = 45$.
12. Ans. (c) $4 \times 1 = 28$. is got thus : 4×1 gives 41. Multiply this by 2 to get 82. Interchange the digits to get 28.
 Similarly 4×3 gives 43 which gives 86 which gives 68.
Note : In the question $1 \times 0 = 63$. should be simply ignored.
13. Ans. (b) $12 \times 23 = 3221$ means 1223 reversed.
14. Ans. (c) $32 \div 16 = 21$ is got thus : $32 \div 16 = 2$. Simply add to get 21.
 Similarly $90 \div 18$ gives $90 \div 18 = 5$ add 1 to get 51
15. Ans. (a) $15 \div 3 = 51$ is got thus. Divide 15 by 3
 Divide 3 by 3. We get 5 and 1 respectively. So write 51.
 Divide 27 and 6 by 3 each to get 9 and 2. Hence the second equation.
 Similarly $21 \div 12$ gives 7 and 4.

EXERCISE VIII

Instruction : Choose the response that will continue the given series :

- 124, 235, 346, 457, 568,.....
 (a) 678 (b) 679
 (c) 789 (d) 609
- 246, 357, 460, 579,.....
 (a) 759 (b) 680
 (c) 678 (d) 459
- 353, 464, 575,.....
 (a) 686 (b) 764
 (c) 777 (d) 796
- 1243, 2354, 3465,.....
 (a) 4367 (b) 4675
 (c) 4796 (d) 4576

1324, 3546, 5768,.....

(a) 7970

(c) 7650

(b) 7980

(d) 7320

Answers

1. Ans. (b)

4. Ans. (d)

2. Ans. (b)

5. Ans. (b)

3. Ans. (a)

EXERCISE IX

Instruction : Complete the series.

1. A, Z, B, Y, C, X,.....
2. B, C, Y, X, E, F, V, U, H,
3. B, D, G, K,.....
4. U, R, N, K, X, G,.....
5. Z, T, O, K, H,.....
6. E, H, L, O,
7. W, U, R, N, I,.....
8. G, 2, F, 3, J,.....
9. P/3, N/9, K/27,.....
10. C 5, E 7, H 10, L 14,.....
11. 4/H, K/9, 19/0, R/39,.....
12. A/2, 4/C, E/6,.....
13. B/3, 9/D, F/81,.....
14. L E, M F, O H, R K,.....
15. H M Q, K P T, N S W,.....
16. P O N, R Q P, T S R,.....
17. D E F O, E F O D, F O D E,.....
18. C/K, F/M, I/O, L/Q,.....
19. G/T, J/S, M/R, P/Q,.....
20. X/C, V/E, S/H,.....

Answers.

This exercise is based on the application of the formation of series to alphabet in-stead of to numbers. will have to identify, first, whether there is only one there are two series.

1. Ans. D. Obviously there are two series i.e.
(i) A, B, C, D,.....(ii) Z, Y, X,.....

2. Ans. I. There are two series. The first series is formed thus :
B, C, E, F, H, I, i.e. omit one letter and take the next two letters. The letter that we require as answer belongs to this series. The second series is formed the same way from the rear side of the alphabet.
3. Ans. P. The series starts with B and omits 1, 2, 3, 4 letters respectively to get the terms of the series.
4. Ans. D. Consider the alphabet from the rear side, starting with U. Omit 2, 3 letters alternately to get the terms of the series.
5. Ans. F. Starting with Z from the rear, omit, respectively 5, 4, 3, 2 and 1 letters in between to get the terms of the series.
6. Ans. S. Starting with E, omit 2 and 3 letters alternately.
7. Ans. C. Starting with W from the rear side, omit 1, 2, 3, 4, letters respectively.
8. Ans. O. The given series consists of a number series and a letter series. We take the letter series to get the required term of the series. The series will be C, 2, F, 3, J, 4, O, 5 etc.
9. Ans. G/81. The numerators follow a series of letters, starting with P from the rear side and omitting 1, 2, 3, letters respectively. The numbers constitute the geometric progression 3, 9, 27, 81....
10. Ans. Q 19. Here each term consists of a letter and a number.
11. Ans. Y/159. Here numbers form one series, starting with 4 and alternately appearing in the numerator and denominator. The number series is 4, 9, 19, 39, 79. ... The differences between the terms are 5, 10, 20, 40. ... The letters form the second series.
12. Ans. 8/G.

s. 6561/H (Note : 6561 is square of 81).
 ns. VO. Consider the first letters in the terms as
 ne series i.e. L, M, O, R. In this series 0, 1, 2, 3
 letters are omitted to get the next terms. The second
 letters form another similar series.

Ans. QVZ

Ans. VUT

Ans. ODEF: There are four letters and their com
 nations follow the cyclic pattern.

8. Ans. O/S. Numerators follow one series in which
 two letters are omitted to get the next term. C, F, I,
 L, O. Denominators follow another series in which
 one letter is omitted to get the next term: K, M, O,
 Q, S.

19. Ans. S/P

20. Ans. O/L. The numerators consists of a series X, V
 S,...in which 1, 2, 3, letters are omitted from th
 rear side, The denominators form the series
 E, H.

EXERCISE X

Instruction : Answer the following :

1. If JOEJB means India, then the last letter of the
 word got by decoding BSNZ is
 (a) W (b) X
 (c) Y (d) Z
2. If QMBO is the code word for 'Plan', then
 NJOJTUFS is.....
3. If BVZHG means YEAST, what does DVZI mean
 (a) BEAR (b) WEAR
 (c) DARK (d) BARK
3. If QBSJT stands for Paris, MPOEPO stands for
 (a) Quebec (b) Larger
 (c) London

5. If EQOG stands for COME, what is the last letter of the code message for "Nothing to report"?
- (a) U (b) S
(c) R (d) V
6. If REAP is coded as ZMOS, how will you code PEER?
- (a) MOSZ (b) KPTC
(c) FKKQ (d) SMMZ
7. If the word 'STAND' is written in code as TSBMC, how would you write 'SLEEP' in code?
- (a) MKOOS (b) TKFFO
(c) RGMMB
8. If the word HAPPEN is coded as IJBCQRQRFGOP, what would CDFGTUUV stand for
- (a) WEST (b) NAME
(c) BEST (d) LAME
9. If 'DANCE' is coded as 52861, 'ANT' is coded as 283, 'SAT' is coded as 723, what would 73285 stand for?
- (a) SHIFT (b) STAND
(c) START (d) REFER
10. ARGUE is coded 6, 23, 12, 26, 10, and LIFT is coded 17, 14, 11, 25, how will you codify CHARGE?
11. If SLEEP is coded as XMKKKB, SPEAR is coded as XBKOY and PULL, as BFMM, how would you encode PLEASURE?
- (a) KMNOXYZ (b) BMOKXFYK
(c) BMKIOXFYK (d) MOKXBFYK
12. If VKRYH means SHOVE, what would SLVWRO mean?
13. If A=2, B=3, and C=4, and so on, what is the word given by the code word 21, 6, 2, 4, 9, 6, 19?

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If FLOWER is coded as UOLDVI, what is the word represented by the code NVIRG ?
If in code language RSNO means STOP ? What will be last letter of the code word of the word CROW ?

- (a) G
- (b) V
- (c) P
- (d) X

Answers

1. Each letter in the word corresponds to the next letter in the alphabet in the code. e.g. $I \rightarrow J$; $N \rightarrow O$; $D \rightarrow E$ etc. So while decoding, $B \rightarrow A$; $S \rightarrow R$; $N \rightarrow M$; $Z \rightarrow Y$. So the word got by decoding BSNZ. is 'Army'. In the Examination hall, in order to save time, you should find the decode for 'Z' only to get the answer. Ans. (c).
2. Ans. Minister.
Code : $P \rightarrow Q$, $L \rightarrow M$ etc.
3. Ans. (b)
Code : Each letter in the word is coded as the letter of the alphabet which has the same numerical position from the rear as the letter has from the beginning of the alphabet e.g. $B \rightarrow Y$; $V \rightarrow Z \rightarrow A$ etc.
So in the decoding also the same rule is followed.
I.e. $D \rightarrow W$; $V \rightarrow E$; $Z \rightarrow A$; $I \rightarrow R$;
4. Ans. (c)
5. Ans. (d) The last letter for which code is required. 't' \rightarrow V
6. Ans. (d) In the given code, $R \rightarrow Z$; $E \rightarrow M$; So, 'PEER' \rightarrow SMMZ
7. Ans. (b) In the given code, the alphabet is grouped in pairs A, B ; C, D ;one

the pair is coded as the other member. So S is coded as T and T is coded as S.

8. Ans. (c) in the problem, *Happen* is coded as IJBCQRQRFGOB. This means each letter is coded as the combination of the next two letters in the alphabet e.g. $H \rightarrow IJ$.
9. The problem should be corrected as follows : If 'Dance' is coded as 52861, 'ant' is coded as 283, 'Sat' is coded as 723, what would 73285 stand for ?
Ans. (b) From the given code. $d \rightarrow 5$; $a \rightarrow 2$; $t \rightarrow 3$; $n \rightarrow 8$; $s \rightarrow 7$.
10. Ans. 8, 13, 6, 23, 12, 10. In the given code, each letter is coded as the number got by adding 5 to its position in the alphabet. E.g. $a \rightarrow 1+5$; $b \rightarrow 2+5$. etc.
11. Ans. (c) From the given words, $S \rightarrow X$; $L \rightarrow M$; $E \rightarrow K$; $P \rightarrow B$; $A \rightarrow O$; $U \rightarrow B$.
12. Ans. Pistol.
Code : Each letter is coded as the letter which is three places to its right in the alphabet e.g. $S \rightarrow V$.
13. Ans. Teacher.
14. Ans. Merit.
Code : Each letter is coded as the letter from the rear of the alphabet occupying the same position. E.g. $A \rightarrow Z$ $Z \rightarrow A$ etc.
15. Ans. (b)

EXERCISE XI

1. Rearrange the jumbled spellings to form sensible words :

(i) ILNO	(an animal)	(xvi) PALEP	(fruit)
(ii) REGIT	(")	(xvii) NABAAN	(")
(iii) SOREH	(")	(xviii) REAP	(")
(iv) ODG	(")	(xix) MELON	(")
(v) HEPES	(")	(xx) RYHECR	(")

TAOG

- (ii) ACT
- (iii) LUBL
- (ix) SLONISE
- (x) DEPLORA
- (xi) NEGOMAR
- (xii) NOGAM
- (xiii) EGARP
- (xiv) VUGAA
- (xv) CJAK

- (xxi) NCNOI (Vegetable type)
- (xxii) AMTOT
- (xxiii) ROCTAR
- (xxiv) TOOPTA
- (xxv) RIBD
- (xxvi) WROC (a bird)
- (xxvii) CDKU
- (xxviii) KCOC
- (xxiv) LOW
- (xxv) LAEGE

2. The names of certain poets are given below, but the spelling of the names is jumbled. Write down the correct spelling :

- 1. EASKT
- 3. ODRSWOTRHW
- 5. LEYLESH
- 7. LAASKADI
- 9. ROMA

- 2. NBORWING
- 4. FLONGLELWO
- 6. TILOE
- 8. GORATE
- 10. YONRB

3. Rearrange the spelling of the following jumbled words to form sensible words and name the serial number of stranger among them.

- 1. (a) LECYBIC
- 2. (a) OOKSB
- 3. (a) OCTA
- 4. (a) OROD
- 5. (a) LAEPT
- 6. (a) TARS
- 7. (a) LEBU

- (b) TOORESC
- (d) ANTRI
- (b) ENP
- (d) EKNFI
- (b) TOBO
- (d) HISTR
- (b) KESTAB
- (d) LOROF
- (b) ALBETB
- (d) LOTOS
- (b) NAM
- (d) TALEPN
- (b) GTIHL
- (d) GENER

- | | |
|---------------|-------------|
| 8. (a) RITNA | (b) RAG |
| (c) TARC | (d) HIPS |
| 9. (a) LOWO | (b) TOONCT |
| (c) NETERE | (d) KILS |
| 10. (a) NOINO | (b) JINBALR |
| (c) NAMOG | (d) SUHEO |

4. The following pairs give the jumbled spellings or antonyms. Find out the pairs.

- | | |
|-----------------|-------------------|
| 1. KARD : NILTG | 6. JORAM : NORMI |
| 2. ROPO : CIHR | 7. FENRID : YEMEN |
| 3. LEVO : TEAH | 8. VIGE : KEAT |
| 4. GANI : SOLS | 9. ITS : DANST |
| 5. RANE : PENDS | 10. SATF : OWLS |

5. Make sensible words out the letters given below :

- | | |
|------------|----------------------------|
| 1. TOFICIN | (Imaginary thing) |
| 2. COFER | (violence) |
| 3. GAMEI | (imitation of something) |
| 4. HASL | (a form of beating) |
| 5. DMNE | (repair) |
| 6. LABENU | (haze of light in the sky) |
| 7. COPEIL | (civil force) |
| 8. TENR | (paid to landlord) |
| 9. GASE | (a wise-man) |
| 10. TTEN | (a temporary shelter) |

Answers

- (i) Lion (ii) Tiger (iii) Horse (iv) Dog (v) Sheep (vi) Goat (vii) Cat (viii) Bull (ix) Lioness (x) Leopard (xi) Orange (xii) Mango (xiii) Grape (xiv) Guava (xv) Jack (xvi) Apple (xvii) Banana (xviii) Pear (xix) Lemon (xx) Cherry (xxi) Onion (xxii) Tomato (xxiii) Carrot (xxiv) Potato (xxv) Bird (xxvi) Crow (xxvii) Duck (xxviii) Cock (xxiv) Owl (xxx) Eagle.
- (i) Keats (ii) Browning (iii) Wordsworth (iv) Longfellow (v) Shelley (vi) Eliot (vii) Kalidasa (viii) Tagore (ix) Omar (x) Byron.

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- Ans. (c) The words are : bicycle, scooter, couch, train.
- Ans. (d) The words are : Books, pen, paper, knife.
- Ans. (c) The words are coat, boot, table, shirt.
- Ans. (b) The words are : door, basket, window, floor.
- Ans. (a) The words are : plate, table, chair, stool.
- Ans. (b) The words are : star, man, planet.
- Ans. (b) The words are : blue, light, white, green.
- Ans. (c) The words are : train, car, cart, ship.
- Ans. (c) The words are : wool, cotton, terene silk.
- Ans. (d) The words are : Onion, brinjal, mango, house.
1. dark : light 2. poor : rich 3. love : hate / gain : loss 5. earn : spend 6. major : minor / friend : enemy 8. give : take 9. sit : stand / fast : slow.
1. fiction 2. force 3. image 4. lash 5. mend 6. nebula 7. police 8. rent 9. sage 10. tent.

EXERCISE XII

1. Name the letter which precedes the third consonant after fourth vowel of the alphabet
(a) T (b) O
(c) R (d) S
2. Name the vowel which precedes the thirteenth letter of the alphabet
(a) E (b) O
(c) J (d) I

3. Write the letter which succeeds the letter which is midway between G and W
(a) P (b) O
(c) Q (d) N
4. If the number of letters in the alphabet between I and Q is less than the number between R and W but greater than the number between G and N, choose letter K, otherwise, choose the letter which follows M.
(a) K (b) M
(c) N (d) L
5. What is the difference between the number of consonants between the fourth and the last vowels and the number of consonants between the second and the third vowels?
(a) 5 (b) 2
(c) 1 (d) 3
6. If the following letters of alphabet are re-arranged in correct-sequence, which of them will be in the middle?
LKNOSPTRGHXZ
(a) O (b) P
(c) N (d) Q
7. If $Z=2$, $Y=4$, $X=6$, what will P-V stand for?
(a) 10 (b) 6
(c) 12 (d) 7
8. Name the letter which occupies the 10th place among the consonants preceding the last vowel of the alphabet.
(a) N (b) M
(c) I (d) J
9. What is the order of S from the beginning, when the following letters are arranged in order?
ECHJXWUYPLKSRT
(a) 9 (b) 6
(c) 8 (d) 7

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number of consonants between the third and fourth vowels is the same as that between the third and fifth write the letter preceding the second vowel, otherwise write that which follows the second vowel.

- (a) E
 - (c) D
- Answers

1. Ans. (b) Fourth vowel of the alphabet is O. The third consonant after O is R. The letter that precedes R is Q.
2. Ans. (d) The 13th letter of the alphabet is M. The vowel that precedes it is I.
3. Ans. (a) The letter that is midway between G and W is O. The letter that succeeds this is P.
4. Ans. (c) If we are to choose K, two conditions are to be satisfied. The first condition is : the number of letters between I and Q i.e. 7 should be less than the number of letters between R and W i.e. 4. The second condition is : 7 should be greater than the number between G and N i.e. 6. In the present case, the first condition is not satisfied. So 'K' cannot be chosen. So we have to choose the letter that follows M i.e. N.
5. Ans. (b) The number of consonants between O and U is 5. The number of consonants between E and I is 3.
6. Ans. (a)
7. Ans. (c) Since the position of P from the rear is $P=22$. Since V is 5th from the rear, $V=10$. $P-V=12$.
8. Ans. (d) The last vowel of the alphabet is U. 10 numbers to the left of U leaving O.
9. Ans. (a).
10. Ans. (c) The number of consonants between the third and the fourth vowels i.e. I and O.

number of consonants between O and U is also 5. So we should write the letter preceding E.

EXERCISE XIII

1. If the following words are arranged in the order in which they occur in the dictionary, what will be the serial number of 'foveola' ?

fountain, fox, foveola, fovea, fourth

- | | |
|-------|-------|
| (a) 3 | (b) 4 |
| (c) 2 | (d) 5 |

2. If the following words are arranged in a dictionary, what will be the position of 'morality' ?

morality, moralize, morale, morass, moralist, moralism

- | | |
|-------|-------|
| (a) 4 | (b) 3 |
| (c) 5 | (d) 1 |

3. If you arrange the following in a descending order, as they occur in a dictionary, which word will be the last but one ?

(a) Multiplex, Mutilate, Multiple, Muscular, Municipal

- | | |
|---------------|---------------|
| (a) Municipal | (b) Multiplex |
| (c) Multiple | (d) Muscular |

4. If you arrange the following words in an ascending order, as they occur in a dictionary, which will be the second word.

evious, envelope, envoy, envisage, environment.

- | | |
|--------------|-----------------|
| (a) envelope | (b) envious |
| (c) envoy | (d) environment |

5. If the following words are arranged, as in a dictionary, what will be the last letter of the word, occupying the middle position ?

Lingual, Linguistic, Lingo, Lingulate, Linguist.

- | | |
|-------|-------|
| (a) C | (b) L |
| (c) E | (d) T |

6. If the following words are serialised as in a dictionary, which will be the last word p

Reaction Reactive, Reach, Ready, Realize

- (a) Reactive (b) Realize
(c) Ready (d) Reach

Arrange the following sets of words in the order in which they occur in a dictionary :

7. Combine, Comber, Combing, Combustion, Combination
8. Ecstatic, Ecstasize, Ecacious, Ecumenical, Ecstasy
9. Goodness, Goodwill, Good, Gondola, Goodnatured, Goody
10. Mournful, Mound, Mouth, Movable. Mousjik.

Answers

Note : To do this exercise you are not required to know the meanings of the words used. You have simply to see the letter arrangement in the different words.

1. Ans. (b) The dictionary arrangement of the words will be : fountain, fourth, fovea, foveola, fox.
2. Ans (a).
3. Ans. (b) Note that you are required to follow the descending order i.e. the order opposite to that found in the dictionary. The required arrangement will be as follows : mutilate, muscular, municipal, multiplex, multiple. So the last but one (penultimate) word is multiplex.
4. Ans. (b)
5. Ans. (d) The arrangement of words will be : lingo, lingual, linguist, linguistic, lingulate.
6. Ans. (b).
7. Ans. Comber, Combination, combine, combing, combustion
8. Ans. ecstasize, ecstasy, ecstatic, ecumenical, edacious.

9. Ans. Gondola, good, goodnatured, goodness, good-will, goodly.
10. Ans. Moujik, Mound, mournful, mouth, movable.

EXERCISE XIV

1. Think of a single letter, which when introduced in the body of the following words, forms new words :

BED, HERD, MET COT

2. Think of a single letter, which when prefixed to the following words forms new words.

RACK, ALL, OVER, RIB

3. Find a single letter, which when suffixed to the following words, form new words :

CAN, HAT BORN HID

4. Name a single letter which when suffixed to each word in a group, forms new words :

(a) CAR, BAN, CROW, HER

(b) TOW EAR BROW LIE

(c) FAIN PIN CAR PAIN

(d) MAR SIR FAR CAR

(e) SIN WIN LIN RAN

5. Think of a single letter which can be inserted in each word of a group to get new words :

(a) SWAM, DEW, BEAST, STING

(b) SING, COT, MIT KIN

(c) FIT, MAT, POT, CAT

(d) HIT, CAT, SAD, WET,

6. Think of a group of two letters which can be suffixed to the letter-groups in each group below to form sensible words :

(a) HANG, MANG, FLOW, RANG

(b) FIR, AMID, DISGU WOR

(c) LO....., CO....., S....., TH...

7. Name the two-letter group that can be prefixed to all the letter-groups in a row to form sensible words :

- (a) IN, ACE, RING, RAY, EAR
 (b) ORN, ARE, ALE, OPE
 (c) EAST, OWN, INK, AND

Name the three-letter group which can be suffixed to the terms in each group to form sensible words :

- (a) S....., BR....., STR....., CH.....,
 (b) G....., DR....., THR....., L.....,
 (c) H....., CL....., SM....., N.....,
 (d) CL, BR....., CR....., S.....,
 (e) TH....., R....., K....., S.....

9. Name the word which can be prefixed to each term of a group to get sensible words

- (a)NER,GER,CE,GLE
 (b)GO,AGE,EATER,KIND
 (c)DOW,NER,NOW,TER
 (d)BER,D,ON,RACK

10. Insert in the bracket the letter-group that will form proper words with the term in front and the term behind by suffixing and prefixing to them respectively

- | | | |
|---------------|-----|-------|
| (i) POST | () | BOARD |
| (ii) HANDI | () | MAN |
| (iii) RAIL | () | SIDE |
| (iv) CUSTOM | () | ROR |
| (v) PROFIT | () | ST |
| (vi) PRINCI | () | ASURE |
| (vii) SEVEN | () | AGER |
| (viii) DIFFER | () | ICE |
| (ix) LETTER | () | WOOD |
| (x) SKIP | () | SON |
| (xi) CERTAIN | () | ING |
| (xii) SUN | () | BREAK |
| (xiii) BACK | () | ROBE |
| (xiv) SP | () | CH |
| (xv) SPA | () | LAY |

11. *Insert the missing words :*

(i) BLEND	(NEAT)	START
(ii) SLOPE	()	GROOM
(iii) SING	(NINE)	SPEND
LONG	()	CREST
(iii) SEND	(SEED)	FELL
GAME	()	STAY

Answers :

1. Ans. A. The words will be : Bead, heard, meat, coat.
2. Ans. C.
3. Ans. E.
4. Ans. (a) D (b) N (c) T (d) E (e) K
5. (a) R. words : Swarm, drew, breast, string
(b) L. words : sling, colt, hilt, kiln,
(c) S. words : fist, mast, post, cast
(d) N. words : Hint, cant, sand, went.
6. (a) ER (b) ST (c) IN
7. (a) SP (b) SC (c) BR
8. (a) IDE (b) IVE, IFT, ONE (any of these will do) (c) EAR (d) OWN (e) ING
9. (a) SIN (b) MAN (c) WIN (d) BAR
10. (i) CARD (ii) CRAFTS (iii) WAY (iv) ER
(v) ABLE (vi) PLE (vii) TEEN (viii) ENT
(ix) BOX (x) PER (xi) LY (xii) DAY
(xiii) WARD (xiv) IN (xv) RE, DE
11. **Note :** In this question, one illustration is given to show how the central word within bracket should be formed out of the two words on both sides. You are required to form the central word in the next group. For this, see wherefrom the letters in the central word are picked up from the words on either side.
 - (i) Ans. POOR. In the illustration, NEAT is formed out of the words BLEND and START by picking out N from the 4th letter in BLEND, E from the

letter in BLEND, A from the 3rd letter in
ART and T from the 2nd letter in START..
Now you have to form the central word out of
SLOPE and GROOM. So take the 4th letter in
SLOPE i.e. P, next the third letter in SLOPE i.e. o,
next the 3rd letter in GROOM i.e. o and finally the
second letter is GROOM i.e. R.

(ii) Ans. NOSE. In NINE, N is taken from the third
place in SING, I is taken from the second place in
SING. N is taken from the 4th place in SPEND and
E is taken from the 3rd place in SPEND. The same
way pick out letters from LONG and CREST.

(iii) Ans. GATE.

EXERCISE XV

1. Name the part which is found once in MAN and
WOMAN, twice in an INFANT but never in a BOY
or a GIRL.
2. What is that which is found once in a CHILD, once
again in a GIRL, but never in a BOY?
3. What is that which is found once in FLOWERS,
twice in SEEDS AND SAPLINGS but never in
FRUIT?
4. What is that which occurs in HANDS, HEAD and
HEART but not in the BODY?
5. What is that which you do not find in a LINE or a
CIRCLE, but you find once in an ANGLE and a
TRIANGLE and thrice in a QUADRILATERAL?
6. What is that which occurs once in a YEAR, twice
in a WEEK, but never in a day?
7. Name the thing which is found in NAIL, FINGER
and HAND, but not in an ARM?
8. What is that which you find once in your THUMB
twice in your COFFEE, but miss it in your MILK?
9. What is that which occurs in OCTOBER, twice
in NOVEMBER, thrice in SEPTEMBER, but
in JULY or AUGUST?

10. What is that which occurs twice in WEDNESDAY, once in TUESDAY, but never in any other week day ?

Answers ;

1. Ans. N. As you may easily see, N is found once in the words 'man' and 'woman' and twice in the word 'infant' but not in the words 'boy' and 'girl'
2. Ans. I or L 3. Ans. S. 4. Ans. H or A
5. Ans. A 6. Ans. E 7. Ans. N.
8. Ans. E. 9. Ans. E. 10. Ans. E.

EXERCISE XVI

1. X and Y are parents of Z,
but Z is not the son of X,
what is Z to X ?
2. A is the father of B, but B is not A's son. What is B to A ?
3. A is the cousin of the father of B. What is B to A ?
4. B's son is the cousin of A's son. A has no brother.
What is B to A ?
5. The old man's son is my son's uncle. What relation is the old man to me ?
6. B is the daughter of the wife of A's mother's only son. What relationship is B to A ?
7. X is father of Y and Z but Y and Z are not brothers. What is the relationship of Y and Z ?
8. Looking at a portrait a man said that man's father is my father's son. Brothers and sisters have I none.
At whose portrait was the man looking ?

Answers :

1. Ans : daughter 2. Ans : daughter.
3. Ans : nephew or niece.
4. Ans. sister 5. Ans: Father
6. Ans : daughter. Note that A's mother's only son is A himself. His wife's daughter is also his daughter

ns : Both sisters or brother and sister.
 ns : Son.

Note : While getting the answers for this type of problems based on blood relationships, you should recollect some concrete names and personal relatives and consider the relationships.

EXERCISE XVII

1. Sushil started from his house, walked 2 miles north, then 3 miles west, then 6 miles south. How far away from his house was he then ?
 (a) 3 miles (b) 4 miles, (c) 5 miles.
2. A man travels seven miles eastwards, then turns right and travel three miles, and further turns right again and travels eleven miles. How far is he from the starting point ?
3. A boy walks 9 kilometres due east and then 12 kilometres due South. How far is he from the starting point ?
 (a) 15 kilometers, (b) 6 km. (c) 7 km.
4. A man travels one mile due East. then 5 miles due South, then 2 miles due East and finally 9 miles due North. How far is he from starting point ?
5. A man walked 2 miles south, turned right and walked half mile turned north and walked 5 miles. turned east and walked $4\frac{1}{2}$ miles. How far is he from the started point ?
6. There are 4 persons standing in a row. A is to the right of B. C is to the right of A. D is to the left of C and A, but not at the extreme. Place them in proper order and state sequence starting from left.
7. If 4 men start from a point and covers 16 miles 4 hours in the same direction, how many miles one man covers in 1 hour ?
8. A man was facing East. He took 3 paces forward, turned right, walked another two paces and

turned right against, took three paces and turned about. Which direction was he last facing.

(a) East (b) North (c) South

9. If I stand on my head with my face pointing south words, in what direction will my right-hand point ?
(a) East (b) West, (c) North
10. A girl was standing with her face pointing to the South-East direction. She walked 15 metre and then turned Northwards and walked another 12 metres. How far was she then from the starting-point.
(a) 12 metres (b) 10 metres (c) 9 metres.
11. The time on the watch is quarter to three. If the minute-hand points to North-East in which direction does the hour hand point ?
12. A and B start walking in opposite directions. A covers 3 miles and B covers 4 miles. Then A turns right and walks 4 miles, and B turns left and walk 3 miles. How for is each from the starting point ?
13. A and B start walking from the same point. A goes North and covers 3 kilometres then turns right and covers 4 km. B goes West and cover 5 km. then turns right and cover 3 km. How far apart are they from each other ?
14. A and B start walking in opposite directions. A walked 2 km. and B walked 3 km. Then each turned right and walked 4 km. Then they turned right, A walked 3 km. and B walked 2 km. How far distant apart are they at the end ?
15. A man faces North and covers 12 km. turns West and covers 6 km. then turned South and covers 3 km. and turns West again and covers 6 km. How far is he from the starting point ?
16. A man walked 3 metres towards North, turned West and walked 2 meters then turned North and walked

1 metre and finally turned East and walked 5 metres. How far is he from the starting point ?

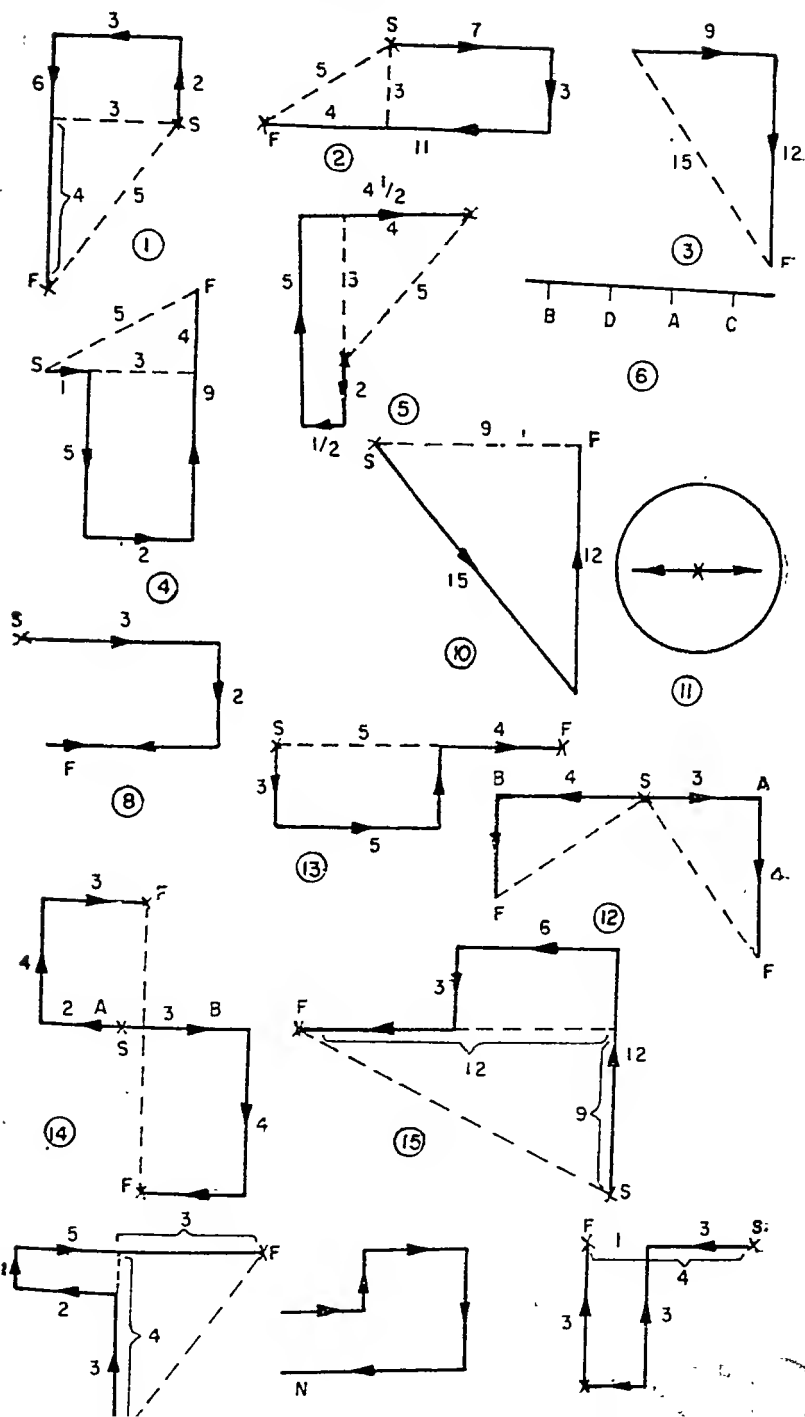
17. A cyclist covered 2 km, in a certain direction, turned left and covered 1 km. then turned right and covered another km. and then turned right again and covered 5 km. and finally turned right and covered 1 km. If he was finally going towards North, in which direction did he start moving ?
18. Shanti travels three miles to the West, turns left and goes three miles, turns right and goes one mile, again turns right and goes three miles. How far is she from the starting point ?

Answers ;

These exercises are based on sense of directions in space and calculation of distances. Use standard directions in a map. To facilitate working, draw diagrams as shown below.

1. Ans. (c) 2. Ans. 5 miles 3. Ans. (a) 15 km.
4. Ans. 5 miles. 5. Ans. 5 miles 6. Ans. BDAC
7. Ans. 4 miles 8. Ans. EAST (Note that distances need not be taken into account for this question.)
9. Ans. (i) East 10. Ans. (c) 9 metres.
11. At quarter to three. we may assume that the minute-hand and hour-hand are diametrically opposite.
Ans. South-West.
12. Ans : 5 miles from the starting point for A and B separately.
13. Ans : 9 km. 14. Ans : 8 km. 15. Ans. 15 km.
16. Ans : 5 km. 17. Ans : South 18. Ans : 4 miles.

Note :—*S*—Starting Point
F—Final Point



EXERCISE XVIII

1. Day after tomorrow is Puja. The same day next week falls the Diwali. Today is Monday. What will be the day after Diwali ?
(a) Wednesday (b) Thursday
(c) Friday
2. If the day that will dawn two days after tomorrow is Friday, What day of the week dawned two days before yesterday ?
3. If 10th of the month falls on the day preceding Monday, on what day will 2nd of the month fall ?
4. If 15th of April falls three days after tomorrow that is Friday, on what day will the last of the month fall ?
5. If the day that dawned two days preceding day-before-yesterday was Sunday, what day of the week will dawn two days following day-after-tomorrow ?
6. Monday dawned on the day preceding three days before day before-yesterday. What day will dawn two days after tomorrow ?
7. Reaching a place of meeting on Tuesday at 15 minutes to 0830 hrs. I found myself half an hour earlier than the man who was 40 minutes late. What was the scheduled time of the meeting ?
8. Arriving at a place of appointment on Sunday, I found that I was three days earlier than the man who was 2 days late. If I had reached there on following Thursday, how many days early or late would I have been ?

Answers :

1. Ans : Thursday
2. Ans : Saturday
3. Ans : Saturday
4. Ans : Tuesday

5. Ans : Monday
6. Ans : Wednesday
7. Ans : 8.05 hours.
8. Ans : 3 days late.

EXERCISE XIX

Answers the following :

1. Which choice provides the answers in the following :
If $1/3$ when multiplied by 6 makes 2, write X;
unless $1/3$ when divided by $1/12$ makes 3, in which
case write Y. Otherwise write Z.
2. If you do not agree that 5115 is divisible by 5,
write word 'RIGHT' otherwise write the word
'WRONG'
3. If two score over forty, write 'False'; if they score
forty, write 'usually false'. If they score under forty
wrote 'True'.
4. During the 1939-45 war, men had joined the
Defence Forces. Therefore, many more women than
men got chance to marry. If right it is true write
'Wrong'; if it is false, write 'Right'
5. If 4 plus 5 makes 8, write 'yes'; unless 16 divided
by 4 makes 4, in which case write 'No'; Otherwise
write X.

Answers :

1. Ans : X. Two conditions are prescribed for writing
Y. Only one condition will enable us to write X. In
order to write Y, the conditions are (i) $1/3 \times 6$
should be equal to 2 (ii) $1/3 \div 1/12$ should be 3. The
second condition is not satisfied and so we cannot
write Y. In order to write X, only the first condition
should be satisfied. If none of the conditions is
satisfied, write Z.
2. Ans : 'wrong' we agree that 5115 is divisible by 5.
3. Ans : 'usually false'. One score is 20.

4. Ans : 'Right'. If men experience difficulties in marrying, women also will experience difficulties. So the given statement is not true.
5. Ans : X

Explanation : The wording of the question should be properly understood. If $4+5$ is equal to 8 and if $16 \div 4$ is 4, we should write 'no'. If $4+5$ is equal to 8 and if $16 \div 4$ is not 4, we should write 'yes'. If $4+5$ is not equal to 8, we should write. X.

2

Elementary Mathematics

Elementary Mathematics, consisting of Arithmetic and Geometry is taught to all students at least upto the Middle Standards in all schools. So you are expected to be familiar with the school-level Arithmetic and Geometry. The Exercises given below are meant to brush up your elementary Mathematics, as required for different Competitive Examinations. In the Bank and Insurance Examinations, there is generally a separate paper on Elementary Mathematics. It may be called 'Numerical Ability Test' or 'Quantitative Aptitude Test'. You require Elementary Mathematics for the I.A.S. Preliminary and Main Examinations. About five questions in the Preliminary Paper are direct Arithmetic and Geometry problems. Besides, as we have pointed out earlier, other General Mental Ability Tests also require arithmetical working. Most questions of the Intelligence Type and Statistical Analysis are based on arithmetic or geometry. So it is necessary for you to ensure that you do the arithmetic, algebra and geometry problems given below systematically.

The first 8 Exercises deal with Elementary Arithmetical Operations, Fractions, Decimals, H.C.F & L.C.M, Roots, Average, Percentage and Ratio and Proportion. These arithmetical operations are essential for solving any applications problems. If you find difficulty with this part, you should do extra work to overcome the difficulty. It does not matter if you take a little longer time than others ; what is important is that you should be able to get the correct answer ultimately and should satisfy yourself with the correctness of your answer through the 'verification methods' which are available for

most of the problems. The remaining Exercises deal with the Applications like Simple Interest, Profit and Loss, Partnership and Shares, Problems with x , Algebraic notations, Power Notations and Progressions. Exercise XVI deals with elementary Geometry problems. The last Exercise consists of some Miscellaneous problems which are very similar to Intelligence Tests.

EXERCISE I

Elementary Arithmetic Operations

1. The greatest number of four digits beginning with 3 and ending with 7 is—

2.

8	7	5	1	0	0
1	3	5	7	9	6
1	2	3	7	5	1
3	4	7	5	3	1

Add 1482178

(a) 1482178

(b) 1382178

(c) 1382578

(d) 1482277

3.

5	0	4	3	2	5
2	1	4	4	5	5
2	8	9	8	8	3

(a) 0, 4, 2

(b) 0, 4, 3

(c) 4, 4, 2

(d) 3, 4, 2

4. If $10 \div 2 = 8$, $14 \div 4 = 10$, then $24 \div 13 = ?$
5. If $6 \times 3 + \frac{2}{3} = 20$; $9 \times 5 + \dots = 47$, then $24 \times 3 + \dots = \dots$
6. Add the numbers from 1 to 10
- (a) 11 (b) 45
- (c) 54 (d) 55 ✓
7. $598211 - 102985 = ?$
- (a) 486226 (b) 495226
- (c) 485216 (d) 495126
8. Fill in the blanks :

$$\frac{3}{7} \times \frac{2}{7} \times \frac{7}{15} = \frac{1}{7}$$

9. $976 \times 999 = ?$
(a) 974444 (b) 974142
(c) 974040 (d) 975024
10. $9999 + 999 + 99 + 9$
(a) 20106 (b) 18106
(c) 11106 (d) 11205

Answers

1. Ans. 3997.
2. Ans. (a)
3. Ans. (c)
4. Ans. 11
5. Ans. 74.
6. Ans. (d)
7. Ans. (b)
8. Ans. 5
9. Ans. (d)
10. Ans. (c)

- (a) $5/2$ (b) $7/3$
 (c) $3/4$ (d) 4
7. $\frac{1}{2} + 1/3 \frac{1}{2} - 1/3 = ?$
 (a) $2/3$ (b) $4/5$
 (c) 3 (d) $5/6$
8. What fraction is a second of a day?
 (a) $\frac{1}{45000}$ (b) $\frac{1}{3600}$
 (c) $\frac{1}{86400}$ (d) $\frac{1}{79200}$
9. Simplify : $2/3 - 2(1/7 + 2/21)$
 (a) $4/21$ (b) $13/63$
 (c) $9/147$ (d) 5
10. Fill in the blank : $5/11 \times 13/12 \times 22/39 \times ? = 1/9$
 (a) $7/9$ (b) $4/5$
 (c) $5/4$ (d) $2/5$

Answers :

1. Ans. (c) Division should be carried out before addition.
 2. Ans. (c) 3. Ans. (d) 4. Ans. (c)
 5. Ans. (b) 6. Ans. (a) 7. Ans. (d)
 8. Ans. (c) 9. Ans. (a) 10. Ans. (d)

EXERCISE III**Decimals**

1. $.5 \times .4 + .80 =$
 (a) .01 (b) .1
 (c) 1 ✓ (d) 2
2. $\frac{.25 \times .25 - .24 \times .24}{49}$
 (a) .1 (b) .01
 (c) .49 (d) .0001
3. $40 \div .0125$
 (a) 3200 (b) 320
 (c) 32000 (d) 3125
4. $\frac{.05 \times .05 \times .05 - .04 \times .04 \times .04}{.05 \times .05 + .05 \times .04 + .04 \times .04}$
 (a) .09 (b) .02
 (c) .2 (d) .01

5. $99 \times .99$
 - (a) 99.01
 - (b) 98.01
 - (c) 99.11
 - (d) 98.11
6. What decimal of an hour is a second ?
 - (a) $.00029$
 - (b) $.00026$
 - (c) $.00028$
 - (d) $.0036$
7. $18.0006 + 14.005 + 12.34$
 - (a) 45.3255
 - (b) 45.3356
 - (c) 44.3456
 - (d) 44.3356
8. $.5 \times .09 + 0.05 = ?$
 - (a) $.05$
 - (b) $.095$
 - (c) 2.3
 - (d) $.5$
9. What decimal fraction is 20 m.m. of a metre
 - (a) $.02$
 - (b) $.2$
 - (c) $.05$
 - (d) $.5$
10. Dividing 35.466 by $.0257$, the result will be
 - (a) $.0138$
 - (b) 1380
 - (c) $.1380$
 - (d) 1280
11. What fraction is 20 paise of Rs. 6.20 ?
 - (a) 31
 - (b) 20 paise
 - (c) $1/31$
 - (d) Rs. $1/31$
12. What is the exchange value in dollars of Rs. 137.75 , when the rate of exchange is Rs. 4.75 to a dollar ?
 - (a) 270
 - (b) 29
 - (c) 28
 - (d) 27.50

Answers :

- | | | |
|--------------|--------------|--------------|
| 1. Ans. (c) | 2. Ans. (d) | 3. Ans. ((a) |
| 4. Ans. (d) | 5. Ans. (b) | 6. Ans. (c) |
| 7. Ans. (c) | 8. Ans. (b) | 9. Ans. (a) |
| 10. Ans. (b) | 11. Ans. (c) | 12. Ans. (b) |

EXERCISE IV

L.C.M. H.C.F. and Remainders

1. Which of the following is the greatest ?

$$\frac{4}{5}, \frac{7}{13}, \frac{11}{15}$$

- (a) $\frac{11}{15}$
- (b) $\frac{4}{5}$

5. The average temperature for Monday and Tuesday was 48° ; that for Tuesday and Wednesday was 46° .

If the temperature for Wednesday was 42° , what was the temperature for Monday.

- (a) 46° (b) 48°
(c) 42° (d) 50°

6. The average of weight of a class of 35 students is 95 kg. If the weight of the teacher be included, the average rises by 1 kg. What is the weight of the teacher ?

- (a) 105 (b) 131
(c) 130 (d) 125

7. Three years ago, the average age of a family of 5 members was 17. A baby having been, the average age of the family is the same today ? What is the age of the child ?

- (a) 3 (b) 5
(c) 2 (d) 1

8. The average salary per head of all employees in a workshop is Rs. 275. The total salary disbursed per month is Rs. 2200. There are officers and the rest are workers. How many workers are there ?

- (a) 5 (b) 9
(c) 6 (d) 3

9. The population of four towns in a district are 35560, 30000, 27500 and 25600 respectively. What is the average population of a town ?

- (a) 29665 (b) 28750
(c) 29758 (d) 28895

10. The average age of a family of 5 members is 30. On the death of a person, the average is reduced to 20. What is the age of the dead person ?

- (a) 10 (b) 80
(c) 70 (d) 50

- (a) 50 (b) 100
(c) 55 (d) 200

8. If the following ratios are arranged in the ascending order of magnitude, which will be the first ratio ?

6 : 14, 5 : 25, 8 : 12, 2 : 7

- (a) 6 : 14 (b) 5 : 25
(c) 8 : 12 (d) 2 : 7

9. $100 : 25 = 64 : ?$

- (a) 32 (b) 8
(c) 4 (d) 16

10. If a sum of money is to be divided between A, B, and C such that A's share is equal to twice B's share and B's share is four times C's share, then their share are in the ratio

- (a) 1 : 2 : 4 (b) 1 : 4 : 1
(c) 8 : 4 : 1 (d) 4 : 3 : 2

Answers

1. Ans. (a) 2. Ans. (d) 3. Ans. (b) 4. Ans. (c) 5.
Ans. (a) 6. Ans. (c) 7. Ans. (b) 8. Ans. (b) 9. Ans.
(d) 10. Ans. (c).

EXERCISE IX

Simple Interest

1. The interest on Rs. 450 for 5 years at the rate of 6% is

- (a) 120 (b) 135
(c) 145 (d) 50

2. At what rate per cent will Rs. 400- amount to Rs. 460/- in 3 years ?

- (a) $6\frac{2}{3}$ (b) 8
(c) 6 (d) 5

3. What will be the amount for a principal of Rs. 200 at the interest rate of 5% in $1\frac{1}{2}$ years ?

- (a) 275 (b) 215
(c) 195 (d) 225

4. I gave some money at simple interest. At the end of 16 years I got three times of my loan. Find the rate of interest.
 (a) 10 (b) $8\frac{1}{4}$
 (c) $12\frac{1}{2}$ (d) 6
5. A certain sum of money becomes three times in 30 years. Find the rate of interest.
 (a) $6\frac{2}{3}$ (b) 10
 (c) 15 (d) 6
6. Find the interest on Rs. 1350 at $4\frac{3}{4}\%$ for 2 years 8 months.
 (a) 169 (b) 152
 (c) 171 (d) 135
7. What will be the interest on Rs. 400/- for one year at $3\frac{1}{2}\%$.
 (a) Rs. 11 (b) Rs. 12
 (c) Rs. 13 (d) Rs. 14
8. Find the simple interest for Rs. 400/- for 6 months at the rate of 4% per annum.
 (a) Rs. 8 (b) Rs. 6
 (c) Rs. 12 (d) Rs. 36
9.
$$S.I = \frac{--- \times R \times T}{100}$$

 (a) Amount (b) P
 (c) Capital (d) Sum
10. The simple interest on a sum of money is $\frac{1}{9}$ of the principal and the number of years is equal to the rate per cent of interest. Find the rate.
 (a) 9 (b) 3
 (c) $3\frac{1}{3}$ (d) $6\frac{2}{3}$

Answers

1. Ans. (b) 2. Ans. (d) 3. Ans. (b) 4. Ans. (c) 5. Ans. (a) 6. Ans. (c) 7. Ans. (d) 8. Ans. (a) 9. Ans. (b) 10. Ans. (c).

Note : P is the principal, R is the rate, (T) is the time in years.

EXERCISE X**Profit, Loss etc.**

1. A man buys an umbrella for Rs. 25 and sells it for Rs. 30. Find his gain per cent.
(a) 5 (b) 20
(c) 15 (d) $16\frac{2}{3}$
2. A man buys a pen for Rs. 24 and sells it for Rs. 20. Find his loss per cent.
(a) 20 (b) $16\frac{2}{3}$
(c) 16 (d) $12\frac{1}{2}$
3. A man has bought a cycle for Rs. 250. For how much should he sell so as to gain 5% ?
(a) Rs. 275 (b) Rs. 290
(c) Rs. 262.50 (d) Rs. 267.50
4. If toffees are bought at the rate of 25 per rupee, how many must be sold for a rupee so as to gain 25% ?
5. A tradesman's prices are 20% above cost price. He allows his customers some discount on his bill and makes profit of 8%. Find out his discount.
(a) 12% (b) 8%
(c) $8\frac{2}{3}$ % (d) 10%
6. A sells a watch to B at a gain of Rs. 10% and B sells it to C at a gain of Rs. 5%. If C pays Rs. 462, what did it cost to A ?
(a) Rs. 250 (b) Rs. 425
(c) Rs. 400 (d) 450
7. A man sold 10 eggs for a rupee and thus gained 20%. How many eggs did he buy for one rupee ?
(a) 12 (b) 15
(c) 16 (d) 8
8. What is the cost price of an article which is sold for Rs. 150 at a loss of Rs. 25% ?
(a) Rs. 125 (b) Rs. 175
(c) Rs. 220 (d) Rs. 200

9. By selling a carriage for Rs. 570, I would lose 5%. At what price must I sell it to gain 5% ?
(a) Rs. 580 (b) Rs. 630
(c) Rs. 610 (d) Rs. 650
10. A tradesman marks his goods at 25% above his cost price and allows purchasers a discount of 10% for cash. What will be his real profit per cent ?
(a) 15 (b) 10
(c) 12.5 (d) $9\frac{3}{8}$

Answers

1. Ans. (b) 2. Ans. (b) 3. Ans. (c) 4. Ans. : 20 5.
Ans. (d) 6. Ans. (c) 7. Ans. (a) 8. Ans. (d) 9. Ans.
(b) 10. Ans. (c).

EXERCISE XI**Partnership, Share etc.**

1. A and B enter into partnership. They invest Rs. 3000 and Rs. 2000. A is a sleeping partner. At the end of one month, both get Rs. 150 each. What is B's remuneration for his work ?
(a) Rs. 50 (b) Rs. 30
(c) Rs. 90 (d) Rs. 65
2. Three partners A, B and C invest Rs. 2000, Rs. 2500 and Rs. 1100 in a business. The total profit for a period is Rs. 560. How much will C get ?
(a) Rs. 250 (b) Rs. 110
(c) Rs. 200 (d) Rs. 220
3. Two partners A and B invest a total amount of Rs. 2500 in a business. A has contributed Rs. 700 more than B. The total profit for a period is Rs. 750. How much will A get more than B ?
(a) Rs. 250 (b) Rs. 340
(c) Rs. 120 (d) Rs. 210
4. 6% interest is quoted on oil shares. An income of Rs. 150 can be obtained from these shares by investing——

- (a) Rs. 2500 (b) Rs. 2550
(c) Rs. 2700 (d) Rs. 1450
5. The income tax on the income above Rs. 3600 at 6 paise in the rupee, is Rs. 126. What is the gross income ?
(a) Rs. 5650 (b) Rs. 5700
(c) Rs. 5735 (d) Rs. 5750
6. The income of a person is Rs. 11500. What is the amount of income tax, he has to pay if the first Rs. 8000 of one's income is exempted and the remainder is taxed at the rate of 17%.
(a) Rs. 450 (b) Rs. 675
(c) Rs. 595 (d) Rs. 1950
7. A man insures his life for Rs. 5000. What will be the half-yearly premium at the annual rate of $2\frac{1}{2}\%$?
(a) Rs. 125 (b) Rs. 62.50
(c) Rs. 250 (d) Rs. 150
8. For what sum should goods worth Rs. 9500 be insured at 5% so that in case of loss, the owner may recover the premium and the value of the goods ?
(a) Rs. 9975 (b) Rs. 11500.
(c) Rs. 10000 (d) Rs. 9250
9. How should a profit of Rs. 450 be divided between two partners of whom one contributed Rs. 1200 for 5 months and the other Rs. 750 for 4 months ?
(a) 2 : 1 (b) 12 : 7
(c) 5 : 4 (d) 60 : 28
10. A invested Rs. 4000 and B invested Rs. 1000 more than A. What will be the share of B in the total profit of Rs. 720 ?
(a) Rs. 450 (b) Rs. 400
(c) Rs. 500 (d) Rs. 350

Answers

1. Ans. (a) 2. Ans. (b) 3. Ans. (d) 4. Ans. (a) 5. Ans. (b) 6. Ans. (c) 7. Ans. (b) 8. Ans. (c) 9. Ans. in the ratio 2 : 1. 10. Ans. (b).

EXERCISE XII

One Unknown Quantity (X)

- To a certain number, 7 is added. The sum is multiplied by 5, the product is divided by 9 and 3 is subtracted from the quotient. The remainder left is 12. The number will be — — —
 (a) 30 (b) 20
 (c) 40 (d) 60
- A man engages a servant on the understanding that he would get Rs. 100 and a turban after a year's service. He served only for 8 months and received the turban and Rs. 64. What is the price of the turban?
 (a) Rs. 8 (b) Rs. 12
 (c) Rs. 16 (d) Rs. 24
- If 40 metres of muslin and Rs. 60 cash can be given in exchange for Rs. 36 metres of silk at Rs. 5 per metre, what is the price of muslin per metre?
 (a) Rs. 4 (b) Rs. 62
 (c) Rs. 3 (d) Rs. 20
- A father had three sons and they were born at an interval of 3 years. The total age of the three sons is 24 years. What is the age of the youngest son?
 (a) 8 (b) 6
 (c) 11 (d) 5
- If $1\frac{1}{2}$ years are added to $\frac{3}{4}$ of age of a person, he will be half his age. What is his actual age?
 (a) 20 (b) 21
 (c) 25 (d) 3
- If 3 times a number (positive) is equal to the difference between 14 and number, what is the number?
 (a) $3\frac{1}{2}$ (b) —
 (c) $3\frac{1}{2}$ (d) —

7. Ram's father is 4 times as old as Ram. Five years ago his father was 9 times as old as he was then. What is the present age of Ram's father ?
 (a) 24 (b) 32
 (c) 35 (d) 48
8. In an isoscales triangle, the sum of the base angles is equal to the difference between the vertical angle and any one base angle. Find the base angle.
 (a) 30° (b) 45°
 (c) 36° (d) 90°
9. Two boys A and B whose total weight is 50 kg. are balanced on a see-saw. If A and B are respectively at distance of 2 and 3 metres from the fulcrum, determine the weight of A.
 (a) 30 (b) 35
 (c) 25 (d) 24
10. A servant maid is engaged on the condition that she would be paid Rs. 40 p.m. and a pair of sarees at the end of a year. She works for 10 months and has received her salary for 9 months regularly. For the last month she is given the pair of sarees without any monetary remuneration. What should be the cost of the sarees ?
 (a) Rs. 240 (b) Rs. 60
 (c) Rs. 48 (d) Rs. 40

Answers

1. Ans. (b) 2. Ans. (a) 3. Ans. (c) 4. Ans. (b) 5. Ans. (b) 6. Ans. (a) 7. Ans. (b) 8. Ans. (c) 9. Ans. (a) 10. Ans. (a).

EXERCISE XIII

Algebraic Notations

1. $26 - [5 + \{12 - (12 - 3)\}] = ?$
 (a) 18 (b) 8
 (c) 26 (d) 14

2. $35 - 2(9 - 3 \times 7) = ?$
 (a) 48 (b) 59
 (c) -42 (d) 63
3. $5 \times 9 - [4 \times 2 - 3(7 - 2) - 2\{1 - 4(1 - 3)\}] = ?$
 (a) 66 (b) -23
 (c) -62 (d) 45
4. $13a - a\{5 - 2(1 - 7)\} = ?$
 (a) 6a (b) $2a$
 (c) 13 (d) $-4a$
5. $25 - 6 \times 3 + 24 \div 4 = ?$
 (a) 15 (b) 13
 (c) -12 (d) 21

Answers

1. Ans. (d)
 2. Ans. (b)
 3. Ans. (a)
 4. Ans. (d)
 5. Ans. (b)

EXERCISE XIV**Power Notation**

1. The value of $[(6)^3]^2$ is
 (a) $6 \times 3 \times 2$ (b) 216×2
 (c) 6^6 (d) 6^9
2. The value of $\frac{7^4}{7^2}$ is
 (a) 7×4 (b) 7×8
 (c) 49 (d) 7^6
3. The value of $\left\{\frac{6^4}{9^3}\right\}^2$ is
 (a) $(4/3)^4$ (b) $32/81$
 (c) $(2/3)^2$ (d) 36
4. $(2^3 \times 3)^2 = ?$
 (a) $2^5 \times 3^2$ (b) 576
 (c) 624 (d) $2^3 \times 3^2$

4. The length of the largest pole that can be placed in a room of dimensions 6 metres and 4 metres and 4 metres is

(a) $\sqrt{14}$ m.	(b) 10 m.
(c) $\sqrt{68}$ m.	(d) 96 m.
5. The circumference of a circle of diameter 7 cm, is

(a) 7π cm.	(b) 14π cm.
(c) 21 cm.	(d) 42 cm.
6. The cost of turfing a square playground with a side 100 m. at the rate of Re. 1 per 100 sq. m. will be

(a) Rs. 150	(b) Rs. 1000
(c) Rs. 100	(d) Rs. 10
7. The total surface of a cube with side 6 cm. is

(a) 144 sq. cm.	(b) 216 sq. cm.
(c) 246 sq. cm.	(d) 48 sq. cm.
8. The base of a right angled triangle is 8 and its hypotenuse 10. Find its area

(a) 30	(b) 40
(c) 24	(d) 48
9. Breadth of rectangle $\frac{?}{\text{length}}$
10. If the radius of circle is increased by 100%, the area is increased by

(a) 100%	(b) 200%
(c) 300%	(d) 400%
11. A quadrilateral, of which only two sides are parallel is called

(a) Rhombus	(b) Parallelogram
(c) trapezium	(d) rectangle
12. Find the surface of a ball whose radius is 3''

(a) 6π	(b) 9π
(c) 24π	(d) 36π
13. Area of a parallelogram = ? \times height
14. Diagonal of a square = $\sqrt{? (\text{length})^2}$

15. How many edges has a cube ?
(a) 10 (b) 8
(c) 12 (d) 4
16. If each side of a cube is doubles, its volume becomes.
(a) eight times (b) four times
(c) double (d) 6 times
17. The altitude of a triangle of 216 sq. cm. area with base 24 cm. is
(a) 18 cm. (b) 9 cm.
(c) 6 cm. (d) 12 cm.
18. In a right-angled isoceses triangle, if the hypotenuse is 8 cm. what is the area ?
(a) 16 sq. cm. (b) $\sqrt{32}$ sq. cm.
(c) 64 sq. cm. (d) 32 sq. cm.
19. The volume of a spherical ball of radius 3 is
(a) 48π (b) 81π
(c) 36π (d) 72π

Answers

1. Ans. (a) 2. Ans. (b) 3. Ans. (c) 4. Ans. (c) 5.
Ans. (a) 6. Ans. (c) 7. Ans. (b) 8. Ans. (c) 9. Ans.
Area 10. Ans. (c) 11. Ans. (c) 12. Ans. (d) 13.
Ans. base 14. Ans. 2 15. Ans. (c) 16. Ans. (a) 17.
Ans. (a) 18. Ans. (a) 19. Ans. (c).

EXERCISE XVII**Miscellaneous**

1. There are 15 birds on a tree. A hunter fired a gun and only two birds fell down. How many were left on the tree ?
(a) 10 (b) 13
(c) 0 (d) 9
2. A woman sells to a customer half her stocks and half an apple, to the next customer half her remaining stock and half an apple and so on to a third and fourth customer. She finds that she has now 15 apples left. How many had she at first ?

- (a) 250 (b) 350
(c) 245 (d) 255
3. In climbing a greased pole, 15 metres high, a monkey ascends 5 metres and slips down 3 metres in alternate minutes. How long will it take to get to the top.
(a) $7\frac{1}{2}$ m. (b) 10 m.
(c) 11 m. (d) 15 m.
4. How many rounds will a wheel take to go 280 m if its diameter is 28 m.
(a) 100 (b) 50
(c) 10 (d) $\frac{20}{2\pi}$
5. A say to B, "I am twice as old as you were when I was as old as you are". The sum of their present ages is 63 years. Find A's present age.
(a) 36 (b) 45
(c) 18 (d) 28
6. A says to B "I and five times as old as you were when I was as old as you are". The sum of their present ages is 64 years. Find the present age of B.
(a) 40 (b) 24
(c) 36 (d) 8

Answers

1. Ans. (c) 2. Ans. (a) 3. Ans. (c) 4. Ans. (d) 5. Ans. (a) solution : Assume A's age to be X. Then B's age now is $63 - X$. A's age would have been $63 - X$, some years back. The number of years for this is $X - (63 - X)$ i.e. $2X - 63$. At that time, i.e. $2X - 63$ years ago, B's age would have been $(63 - X) - (2X - 63)$ i.e. $126 - 3X$. It is given that $X = 2(126 - 3X)$ So $X = 36$. 6. Ans. (b).

3

Logical Tests

Gone are the days when logic was associated only with thinkers and philosophers. Logic-oriented questions are nowadays commonplace in all Competitive Examinations. A comprehensive study of logic is not possible for a general candidate. But, without a formal study of some logic, it will be impossible for candidates to answer these logical questions with any degree of certainty. So we give below some introductory lessons in Logic.

Logic deals with reasoning process or method. There are two broad branches of logic—Deduction and Induction. Deduction is the process of arriving at (deducing) conclusions from given propositions (also known as statements or premisses). In a Logical Test, when a proposition is given, we take it as correct without questioning its truth in real life. Many a time, in the Logical question, preposterous or unreal statements are given. Still we proceed with them. In fact, here lies the main difference between Intelligence Tests and Logical Tests. In Intelligence Tests, we are not expected to deal with utterly unrealistic hypothetical situations and conditions ; actually, a real life problem is posed to us and we are expected to solve it. But in the Logical Test, we are interested only in the validity (not truth) of conclusions and in the reasoning process. Whether the conclusion follows strictly from the given statements is our only concern. OF course, this is not to mean that Logic cannot or should not be applied to real-life situations and problems. If the given propositions are true or factually correct, we will certainly get valid conclusions which are also true in real life. The diffe-

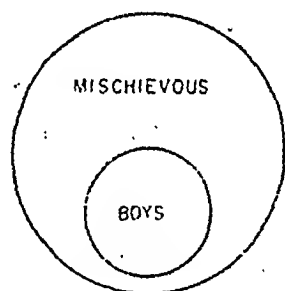
rent processes of Deduction are illustrated and explained in the following pages. These will be almost sufficient to deal with all types of logical tests relevant for the Competitive Examinations.

Some of the Examination questions may couple logic with commonsense and may expect the candidates to answer them using knowledge outside the given propositions. In such a case you will have to understand this implication and act accordingly.

Note : Inductive Logic is not at all required for the Competitive Examinations.

I. Various Forms of the Universal affirmative statement : All S are P.

1. All boys are mischievous :
2. If A is a boy, A is mischievous.
3. Only a mischievous person can be a boy.
4. None but (other than) the mischievous are boys.
5. No non-mischievous person is a boy.
6. Every (Any) boy is mischievous.
7. Boys are mischievous.
8. Boys are always mischievous.



Note : If a statement is given in any of the forms Nos. (2) to (8), it should be rewritten in the form No. (1)

Note : The following conclusions follow from the above statement.

- (a) Some mischievous persons are boys.
- (b) Some boys are mischievous. (understatement).

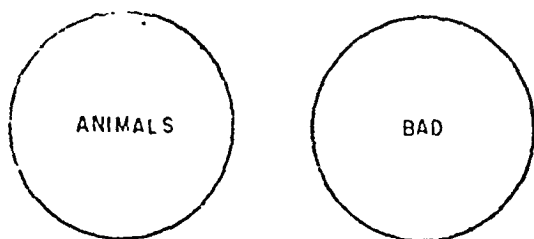
Note : From the given statement, it does not follow that 'All mischievous persons are boys'.

Note : Any universal affirmative statement can be rewritten in form No. (1).

e.g. 'Bats fly in darkness' can be written as 'All bats are things that fly in darkness.'

II. Various Forms of the Universal Negative statement: 'No S are P'.

1. No animals are bad.



2. No animal is bad.
3. No bad thing is an animal.
4. An animal is never bad.
5. If it is bad, it is not an animal.
6. If it is an animal, it cannot be bad.
7. Only a non-bad (good) thing can be an animal.
8. Only a non-animal can be bad.

Note : There is an exactly reciprocal relationship between S and P in this case.

Note : 'Some animals are not bad' is an understatement which follows from the given statement.

III. Particular affirmative: 'Some S are P'

Some boys are good.

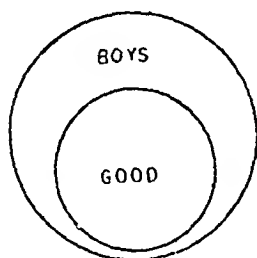
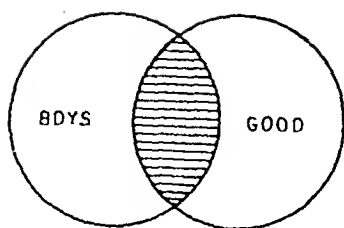
Note : The statement can be represented by either of the two diagrams.

Note : It follows that

'Some good persons are boys'.

Note : Normally it follows that 'Some boys are not good'.

Note : It does not follow that 'Some good persons boys'. (Vide the second diagram).

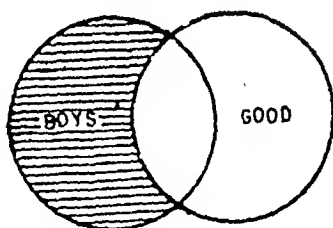


IV. Particular Negative : 'Some S are not P'.

Forms : Some boys are not good.

or

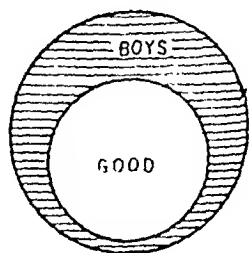
All boys are not good



Note : The same diagrams as in III apply but the portions referred to are different.

Note : Normally it follows that 'Some boys are good' and 'Some good things are boys.'

Note : The converse 'Some good persons are not boys' does not always follow. (*Vide* the second diagram).



e.g. Given that 'Some animals are (not) dogs', it is absurd to conclude 'Some dogs are not animals.'

SOME VALID SYLLOGISMS

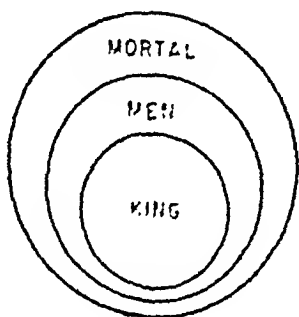
Note : Syllogism is the basic form of deducing conclusions from two given propositions (premisses). We say that a conclusion is 'valid' if, in all possible cases of diagram, that conclusion necessarily follows. In other words, it should not be possible to show even one exception. We say that a conclusion is 'invalid' if it is not possible to have a single diagram in which the conclusion is true. We say that a conclusion 'may be true' if, in one or more cases of diagram, the conclusion is seen to be true whereas, in some other cases, the conclusion is not true. In logic, 'may be true' has the same meaning or force as 'may not be true'.

1. All men are mortal.

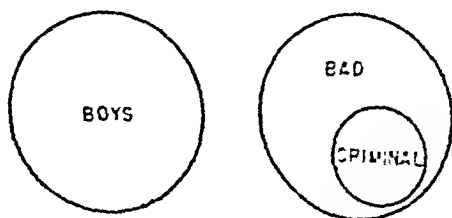
All kings are men.

So, all kings are mortal.

(Valid)



2. No boy is really bad. Hardened criminals are really bad. So, no boy is a hardened criminal. (Valid).



3. No boy is wicked.

Some humans are wicked.

So, some humans are not boys. (Valid).

SOME VALID SYLLOGISMS

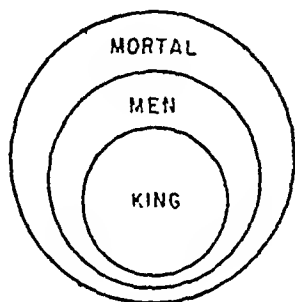
Note : Syllogism is the basic form of deducing conclusions from two given propositions (premisses). We say that a conclusion is 'valid' if, in all possible cases of diagram, that conclusion necessarily follows. In other words, it should not be possible to show even one exception. We say that a conclusion is 'invalid' if it is not possible to have a single diagram in which the conclusion is true. We say that a conclusion 'may be true' if, in one or more cases of diagram, the conclusion is seen to be true whereas, in some other cases, the conclusion is not true. In logic, 'may be true' has the same meaning or force as 'may not be true'.

1. All men are mortal.

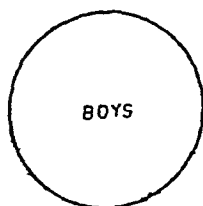
All kings are men.

So, all kings are mortal.

(Valid)



2. No boy is really bad. Hardened criminals are really bad. So, no boy is a hardened criminal. (Valid).

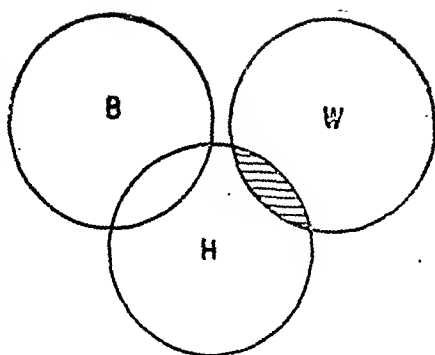


3. No boy is wicked.

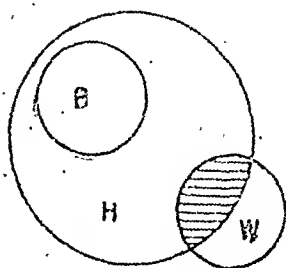
Some humans are wicked.

So, some humans are not boys. (Valid).

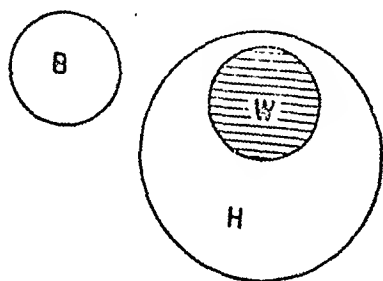
(I)



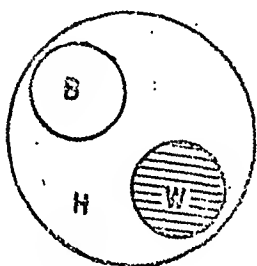
(II)



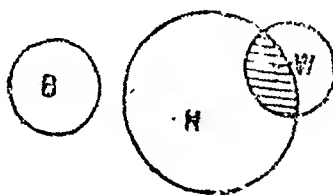
(iii)



(iv)

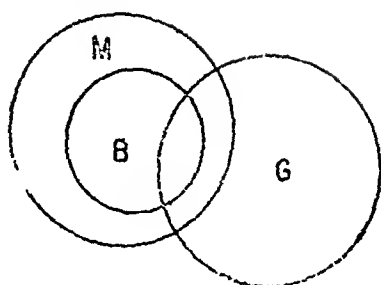


(v)



Note : Diagram for this syllogism can be drawn in five distinct forms. Each diagram conveys a different set of relations between boys, wicked and human. Only Form (iv) corresponds to reality. But, in the logic exercise, we do not attach any special significance to reality.

4. Some boys are good. Boys are always mischievous, So, some mischievous persons are good. (Valid).



Note : Other forms of diagram are possible.

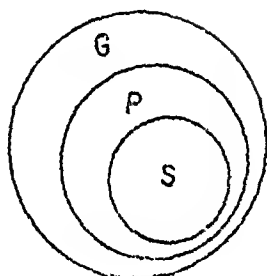
TESTING CONCLUSIONS BASED ON SYLLOGISMS

1. All philosophers are good.

All sages are philosophers.

Conclusions :

- (i) All sages are good. (Valid)
- (ii) No sages are good. (Invalid)
- (iii) Some sages are good.
(Valid)
- (iv) Some sages are not good.
(Invalid)

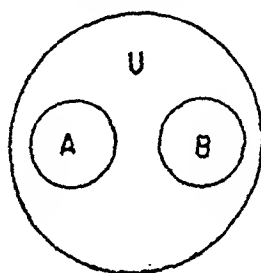


2. All Animals are useful.

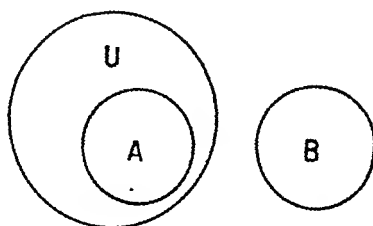
Bacteria are not animals.

Conclusions :

- (i) All bacteria are useful. (May be true)

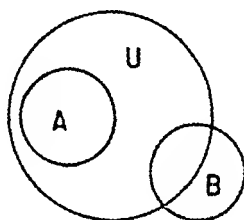


(ii) No bacteria are useful. (May be true)



(iii) Some bacteria are useful. (May be true)

(iv) Some bacteria are not useful. (May be true)



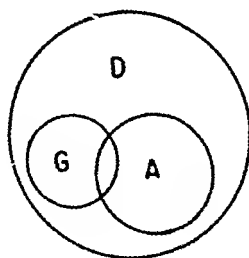
Note : In this type, there is no valid or invalid conclusions.

3. All good things are desirable.

Some animals are good.

Conclusions :

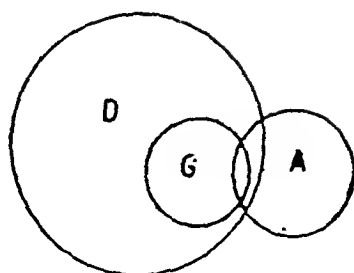
(i) All animals are desirable. (May be true)



(ii) No animals are desirable. (Invalid)

(No diagram is possible)

(iii) Some animals are desirable (Valid)



(iv) Some animals are not desirable.

(May be true)

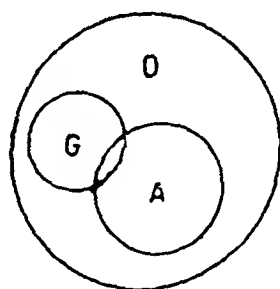
4. All good things are desirable.

Some animals are not good.

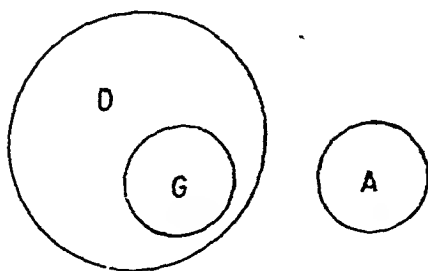
Conclusions :

(i) All animals are desirable.

(May be true)

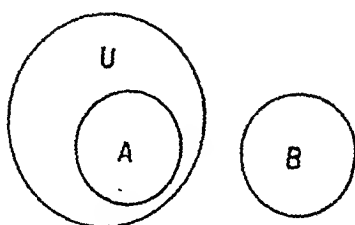


(ii) No animals are desirable. (May be true)



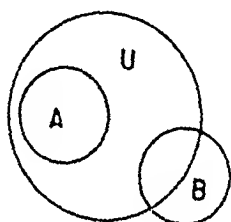
(iii) Some animals are desirable. (May be true)

(ii) No bacteria are useful. (May be true)



(iii) Some bacteria are useful. (May be true)

(iv) Some bacteria are not useful. (May be true)



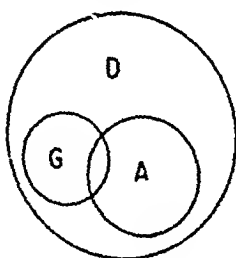
Note : In this type, there is no valid or invalid conclusions.

3. All good things are desirable.

Some animals are good.

Conclusions :

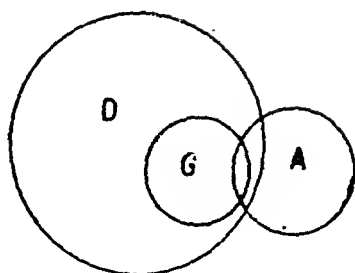
(i) All animals are desirable. (May be true)



(ii) No animals are desirable. (Invalid)

(No diagram is possible)

(iii) Some animals are desirable (Valid)



(iv) Some animals are not desirable.

(May be true)

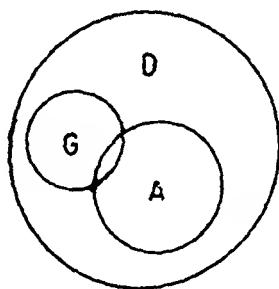
4. All good things are desirable.

Some animals are not good.

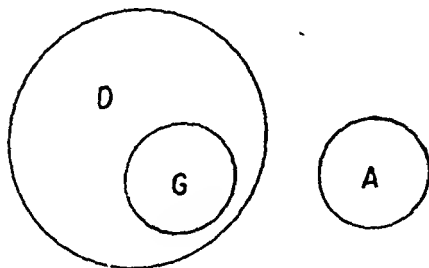
Conclusions :

(i) All animals are desirable.

(May be true)

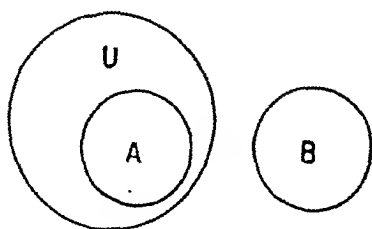


(ii) No animals are desirable. (May be true)



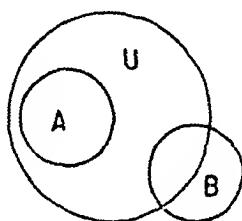
(iii) Some animals are desirable. (May be true)

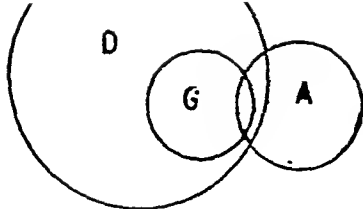
(ii) No bacteria are useful. (May be true)



(iii) Some bacteria are useful. (May be true)

(iv) Some bacteria are not useful. (May be true)





(iv) Some animals are not desirable.

(May be true)

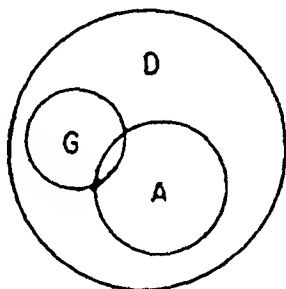
4. All good things are desirable.

Some animals are not good.

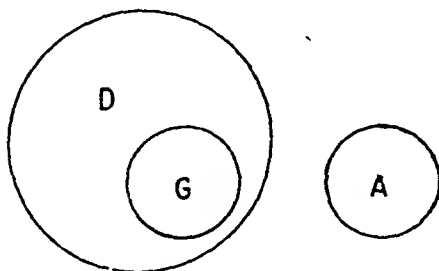
Conclusions :

(i) All animals are desirable.

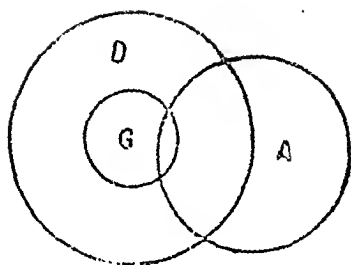
(May be true)



(ii) No animals are desirable. (May be true)



(iii) Some animals are desirable. (May be true)



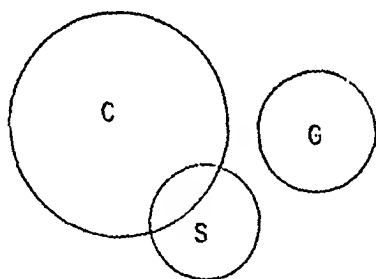
- (iv) Some animals are not desirable. (May be true)
 (v) Some bad animals are desirable. (May be true)

5. No criminals are good.

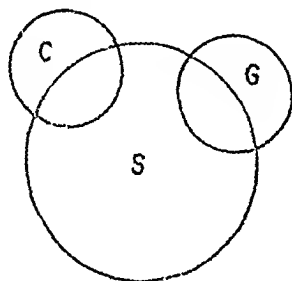
Some students are criminals.

Conclusions :

- (i) All students are good. (Invalid)
 (ii) No student is good. (May be true)

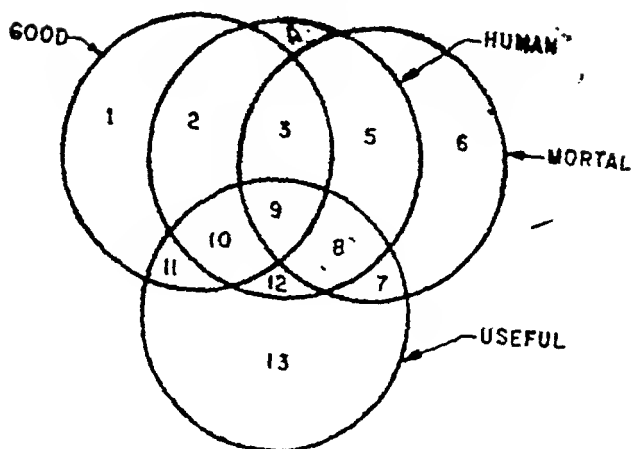


- (iii) Some students are good. (May be true)



- (iv) Some students are not good. (Valid)

DIAGRAM INTERPRETATION



The four circles represent good, human, mortal and useful things.

Portion (1) represents good, non-human, immortal, useless things.

Portion (2) represents good, human, immortal, useless things.

Portion (3) represents good, human, mortal, useless things.

Portion (4) represents bad, human, immortal, useless things.

Portion (5) represents bad, human, mortal, useless things.

Portion (6) represents bad, non-human, mortal useless things.

Portion (7) represents bad, non-human, mortal, useful things.

Portion (8) represents bad, human, mortal, useful things.

Portion (9) represents good, human, mortal, useful things.

Portion (10) represents good, human, immortal, useful things.

Portion (11) represents good, non-human, immortal, useful things.

Portion (12) represents bad, human, immortal, useful things.

Portion (13) represents bad, non-human, immortal, useful things.

INCOMPATIBILITY OF STATEMENTS

Statements : (i) All machines make noise.
(ii) No machine makes noise.
(iii) Some machines make noise.
(iv) Some machines do not make noise.

Conclusions : (1) Statements (i) and (ii) cannot be simultaneously true but both can be false.
(2) Statements (i) and (iii) can be simultaneously true and can be simultaneously false also.
(3) Statements (i) and (iv) cannot be simultaneously true and cannot be simultaneously false also.
(4) Statements (ii) and (iii) cannot be true simultaneously ; also cannot be false together.
(5) Statements (ii) and (iv) can be both true; can be both false also.
(6) Statements (iii) and (iv) can be simultaneously true but can not be both false.

Note : If any three statements are taken, they cannot all be true simultaneously ; they cannot all be false also simultaneously.

Statistical Analysis, Graphs and Diagrams

General Mental Ability Tests include questions to test a candidate's ability to deal with statistical data and tools. Statistical information may be given in any of the three forms (tools). Table, Graph and Diagram. A detailed discussion on the use of these tools is not attempted here. The candidate is expected to have attained the standard required to tackle problems based on tables, graphs and diagrams.

Common to all these forms is the concept of 'variable'. A Statistical tool is meant to present information or data linking two or more variables. A 'variable' is an item which has different values associated with it in different conditions e.g. year, foodgrains production, index number, the numbers of boys in a school etc. A variable is generally denoted by x or y or z . An item which remains constant is known as a constant and is generally denoted by a , b or d . When two or more variables are related, at least one variable will be 'independent'. A 'dependent' variable is one whose different values are dependent on the different values of another variable.

Tables used in objective-type questions are generally either one-way (as in Table 1) or two-way (as in Tables 2, 3 and 4). More complicated tables are generally not given. The questions generally relate to annual rate of increase, maximum percentage of increase or decrease or the trend of movement (change) of a variable. The Calculations involve only elementary arithmetic operations (addition, subtraction, multiplication and division) and percentage. Annual rate of increase

(or decrease) is given by the simple formula $\frac{b-a}{a} \times 100$.

where a is the value of the variable in one year and b is the value in the next year for which the rate of increase is wanted. Tables 3 and 4 make use of economics theory which should be intelligible to a general candidate.

Graphs fall into two distinct categories mathematical (geometrical) and statistical. In the Competitive Examinations, the candidates are expected to deal with both types. So long as the candidate is not asked to draw the graph as is the case in all objective Type Tests, the task is fairly simple. The graphs are already drawn; you are expected only to interpret them properly and, thereby, to answer the questions. The first 5 graphs given below are geometrical in nature. Questions on the equations of the curves and straight lines given in Graphs 1, 2 and 3 are to be answered only by verifying whether certain selected lines given in Graphs 1, 2 and 3 are to be answered only by verifying whether certain selected graph is the locus of a point which traces a path according to given conditions. Using this notion of graph to get the equations of different geometrical curves will be too difficult for a general candidate. Interpretation of distance-time graphs is an important requirement for the Examinations. Graphs 4 and 5 make use of only the elementary formulae: $\text{speed} = \frac{\text{Distance}}{\text{Time}}$ and $\text{Acceleration} = \frac{\text{Velocity}}{\text{Time}}$.

Graph 6 is a discontinuous graph of the statistical type. The data which can be easily given in the form of a simple table are given in the form of a graph. The only questions possible on such graphs relate to annual rates of increase (growth rates). Since this graph is discontinuous, no meaning can be attributed to the points which do not correspond to the years given. The last Graph is also a statistical graph but it can be interpreted continuously since there has to be a price index at every moment of time. This is also a multiple graph, since more than one item (in this case, wholesale price index and consumer price index) are covered in the same graph.

More complicated questions involving the comparison of the two graph lines can also be given.

Diagram is a simple statistical device to present data for visual aid. So diagram interpretation is extremely simple, compared to graph study which can be very difficult when higher mathematics is involved.

Different diagrammatic types are simple bar diagram, broken bar diagram, multiple bar diagram, divided bar diagram, percentage diagram and pie diagram. Two-dimensional diagrams are also there but no problem involving them has been given in the examinations so far. Diagram 1 is a simple bar diagram. The questions normally relate to annual rate of increase and the like. A broken bar diagram is resorted to when one of the items (Y-value) is exceptionally high, compared to all the others. (No example given below). The standard questions in the examinations deal with multiple bar diagrams only. Diagrams 2 and 3 are of this type. Comparisons can be made either between the items of a multiple bar only or between the values of an item in different bars e.g. Only the daytime maximum temperatures at different places in Graph 2 can be compared; or the daytime maximum temperature and the night minimum temperature at a place can be compared. Divided bar diagram is illustrated in Diagram 4.

TABLE 1

Year	Route Length (in km)
1970-71	3706
1971-72	3953
1972-73	4055
1973-74	4191
1974-75	4397
1975-76	4659
1976-77	4720
1978-79	4723
1979-80	4657

Q. 1. The above Table gives the route length of electrified tracks of Indian Railways. During which year was the performance with regard to the construction of route length worst ?

- (a) 1973-74 (b) 1975-76
(c) 1978-79 (d) 1976-77

Ans. (c) Note that the year 1977-78 is left out in the Table. It is clear that the annual addition to the tracks, made during the period under review was the minimum i.e. 3 km (4723-4720) during the period 1977-78 and 1978-79. Separate figures are not available for each of these years. Since in the responses given, only 1978-79 is mentioned, we may attribute this 3 km to that year only. Even then, this will be the minimum annual addition for any year during the period under consideration.

Q. 2. During which year was the annual rate of increase of the route length maximum ?

- (a) 1970-71 (b) 1971-72
(c) 1975-76 (d) 1979-80

Ans. (b) The additional route length for 1971-72 is 247 km. So percentage increase (annual rate) $\frac{247}{3706} \times 100$.

This rate is higher than the annual rate of increase for any other year.

Note : The maximum additional route length created during any year during the period under review is 262 km in 1975-76.

TABLE 2

	1981-82	1982-83
	(Percentage change over previous Year)	
1. Gross National Product at 1970-71 prices	5.2	2.0
2. Agricultural production	5.5	-3.0
3. Foodgrains production	2.7	-4.0
4. Industrial production	8.6	4.0
5. Electricity generated	10.1	7.2
6. Wholesale prices (on point-to-point basis)	2.4	2.8
7. Monetary resources (M_3)	12.3	14.2
8. Imports (at current prices)	8.9	16.1
9. Exports (at current prices)	16.2	17.8
10. Foreign exchange assets (Excluding gold and SDRs)	-30.4	4.3

Q. 1. Point out in which of the above economic indicators was the performance the best during 1982-83.

- (a) Imports (b) Monetary resources
(c) Foreign exchange assets
(d) Exports

Ans. (c). Any annual rate of increase in wholesale prices, Monetary resources or Import indicates bad performance, not good performance. There is some increase in Exports but the rate of increase in Foreign Exchange assets i.e. 4.3% is quite impressive compared to the previous year's performance of (-) 30.4%.

Q. 2. Which of the above economic indicators showed the maximum percentage increase during the year 1981-82 ?

- (a) Electricity generated
- (b) Exports
- (c) Foreign exchange assets
- (d) None of the above

Ans. (b). Note that 16.2% is the maximum figure for any item for 1981-82. Foreign exchange assets has a higher figure but it is negative and hence denotes decrease.

TABLE 3

Number of units sold.	Price of Average revenue	Total Revenue AR x Quantity sold	Marginal Revenue (addition made to total revenue)
(1)	(2)	(3)	(4)
1	22	22	22
2	21	42	20
3	20	60	18
4	19	76	16
5	18	90	14
6	17	102	12
7	16	112	10
8	14.5	116	4
9	14	126	10
10	13	130	4

Q. 1. Read the above table. If the cost of production one unit is Rs. 8/-, how many units should be sold to sell ?

- (a) 130
- (b) 10
- (c) 8
- (d) 7

Ans. (d). When he sells 7 units, his marginal revenue is Rs. 10, a little more than his cost price. But if he sells 8 units, his marginal revenue decreases to Rs. 4 which is less than his cost price. If he sell 9 units

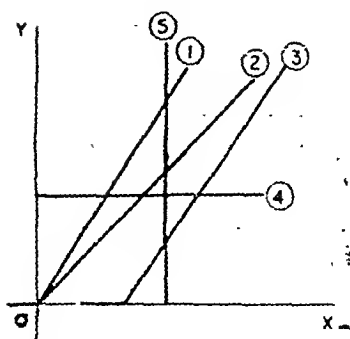
TABLE 4

Number of Workers	Total Return	Marginal Return	Average Return
(1)	(2)	(3)	(4)
1	80	80	80
2	170	90	85
3	270	100	90
4	368	98	92
5	430	62	86
6	480	50	80
7	504	24	72
8	504	0	63
9	495	-9	55
10	440	-55	44

(a) 7 (b) 4
(c) 3 (d) 10

Ans. (b). Labour productivity will be the maximum when the average return per worker is the maximum. This is the case with 4 workers (average return 52). Total return is to be taken into account only when plant productivity is considered.

GRAPH 1



In this Graph, five graph lines are given. They are all straight lines. Questions may relate to their Equations. It is neither desirable nor necessary for a general I.A.S. candidate to spend sufficient time to learn the mathematical formula for different curves or the method of finding out the loci (Equations) of the curves traced by a point under given conditions. It is enough if you are able to verify the different responses (Equations) given in the Question with reference to the curve and to come out with the Equation (response) which fits in.

Q. 1. Graph Line 1 is best represented by the equation

- (a) $y=mx+c$ (b) $y=1/x$ (c) $y=mx$ (d) $y=x$

(Note : Assume c and m to be fixed numbers)

Ans : (c). Response (a) is ruled out since when $x=0$, value should be c which is not true. Response (b) is ruled out since when $x=0$, y value should be infinite which is also not true. So we have to choose between (c) and (d). If we take any point on the straight line, other than $x=0$, $y=0$, we find that y value is more (different from) the x value. So (d) is also ruled out.

Q. 2. Graph Line 2 is given by the formula

- (a) $y=x$ (b) $y=mx+c$ (c) $y=x^2$ (d) $y=-x$

Ans : (a). To verify the formula for a straight line, you have to try only two points on it, one point preferably being the point where the line cuts X-axis or Y-axis. In this case, if you take any point on the

line, you will find that the x value and y value of the point are nearly equal. Thus (a) is the correct response. Response (b) is ruled out since the straight line passes through the origin. Similarly the other responses should be ruled out.

Q. 3. Which of the following relationships between x and y best defines the position of Graph Line 3 ?

(a) $y=mx$ (b) $y=c$ (c) $x^2+y^2=a^2$ (d) $y=mx+c$

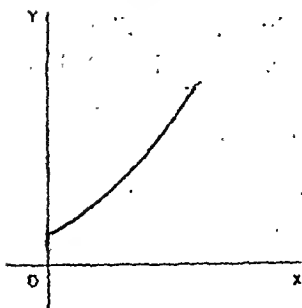
Ans. : (d). Response (a) is ruled out since the straight line does not pass through the Origin. Response (b) indicates that y -value of all the points on the line is constant which is not the case here. Response (c) is ruled out since it indicates two y -values (\pm) for any x -value which is not a true of a straight line. Finally, put $y=0$ in (d), we get $x=-\frac{c}{m}$. This corresponds to the point where the straight line cuts the X -axis. (c should have a negative value in this case).

Note : (1) The equation for the Graph Line 4 is $y=c$ since, for all points on this line, y -value remains constant.

(2) Similarly Graph Line 5 is given by the equation $x=c$.

GRAPH 2

GRAPH 3



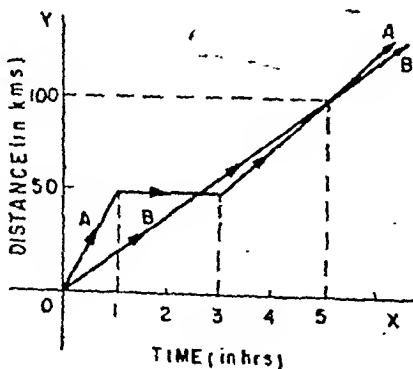
Which of the following equations will best represent the given graph ?

- (a) $x=y-c$ (b) $xy=c$ (c) $y=e^x$ (d) $y=x^2$

Ans : (c). Response (a) is ruled out since it represents a straight line. Response (b) will mean that as xx increases, y decreases which is not the case here. Response (d) can be ruled out only because the curve does not pass through the origin. Response (c) indicates that as $x=0$, $y=1$ and that as x increases, y should increase very sharply (assuming e to be positive).

Note : If the curve given had passed through the origin, then it would have been practically possible for a candidate to choose between (c) and (d) without further details. In fact, curves for $y=x^2$, $y=x^3$ etc. will be hardly distinguishable from one another for a general candidate.

GRAPH 4



Note : At a glance you should be able to understand that Graph 4 represents the motions of two individual A and B who start from the same place at the same time and travel in the same direction with varying speeds. The questions set need not give this amount of elaborate discussion.

Q. 1. At what time, since the commencement of the travel of A, do A and B meet first ?

- (a) 3 hours (b) 5 hours
(c) 12 hours (d) $2\frac{1}{2}$ hours.

Ans. (d). Note that A and B meet even when A is taking rest. The second meeting is at the end of 5 hours.

Q. 2. What is the speed of A during the second lap of his travel ?

- (a) 50 Km/h (b) 30 Km/h
(c) 25 Km/h (d) 20 Km/h

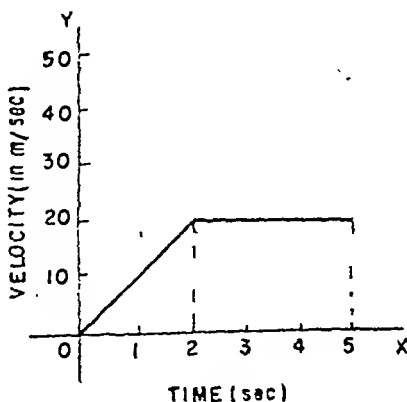
Ans : (c). Note that A covers 50 Km in 2 hours uniformly.

Q. 3. At the end of 4 Hours, by how much distance has B overtaken A ?

- (a) 30 Km (b) 25 Km
(c) 10 Km (d) 5 Km.

Ans. (d). A has travelled 75 Km and B, 80 Km.

GRAPH 5



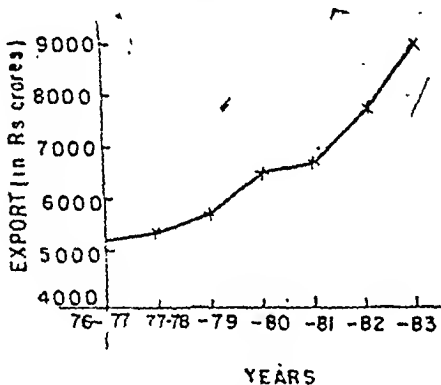
1. The Graph displays the motion of a particle along a straight line. What is the distance covered by the particle in 4 seconds from the starting time ?
 (a) 20 Km (b) 25 Km
 (c) 60 Km (d) 80 Km

Ans. (c). Distance = velocity \times Time. In the graph, it is indicated by the area i.e. $(\frac{1}{2} \times 20 \times 2) + (20 \times 2)$.

2. If the particle had maintained the same acceleration as at the starting point, throughout its motion, how much more distance would it have travelled in the 4 seconds ?
 (a) 10 Km (b) 20 Km
 (c) 60 Km (d) 100 Km

Ans. (b). The additional distance is indicated by the additional area of the triangle that we will get by extending the first straight line i.e. $\frac{1}{2} \times 20 \times 2 = 20$.

GRAPH 6
INDIA'S EXPORT



1. During the period under review, India's Export was
 (a) Uniformly increasing (b) steadily increasing
 (c) Fluctuating (d) unpredictable

Ans. (b). Uniform increase could be there only if the entire graph was a straight line. Fluctuation could be there only if there was at least one decrease.

2. During which year was India's export register the maximum growth ?
 (a) 1978-79 (b) 1979-80
 (c) 1981-82 (d) 1982-83

Ans. (d) Visually you can decide that the slope of the last segment of the graph line i.e. for 1982-83 is the maximum. Note that the annual rate of increase is given by the slope of the straight line segment.



GRAPH 7

Q. 1. During which of the following periods was the whole-sale price Index relatively steady ?

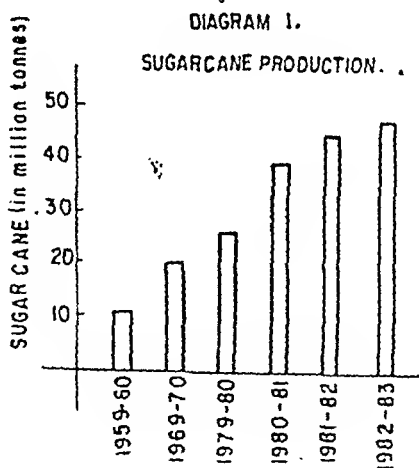
- (a) 72—74 (b) 75—77
(c) 77—79 (d) 78—80

Ans. (c) Only during the two year period 77-79 the price fluctuations were minimum and steep rise or fall was not there.

Q. 2. Which year was the year of significant and relatively steady decline in consumer price index ?

- (a) 1971-72 (b) 1974-75
(c) 1975-76 (d) 1978-79

Ans. (c) Although there was a slight increase in the index during the first Quarter March to June of 1975-76 throughout the remaining period there was steady and significant decrease.

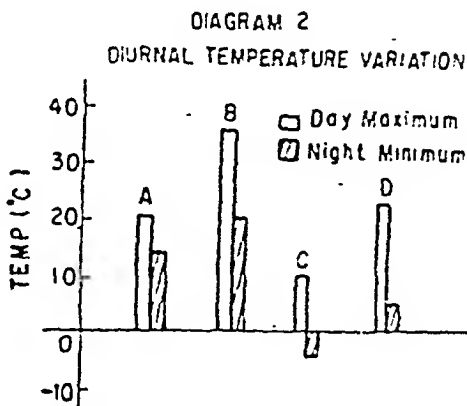


Q. 1. During which of the following periods was there a break-through in sugarcane production ?

- (a) 1969-70 (b) 1980-81
(c) 1981-82 (d) 1982-83

Ans. (b) The first three bars in the Diagram cover the changes during two decades. So the increase of 100% associated with the second bar applies to the decade 1960-70. For 1980-81, the percentage increase

over the previous year is more than 50%. So we may call it a break-through.



1. The maximum and minimum temperatures on a particular day, for 4 places A, B, C and D are shown in the Diagram. In which place was the average of the daytime maximum temperature and the night minimum level?

(a) A (b) B
(c) C (d) D

Ans. (c) In fact, both the daytime and night temperatures were the minimum at C.

2. In which place do you find the extreme variation of the diurnal temperatures?

(a) A (b) B
(c) C (d) D

Ans. (d) At D, the temperature variation for the day was nearly $22^{\circ} - 5^{\circ} = 17$ degrees. Note that the temperature variation at C is only $10^{\circ} + 3^{\circ} = 13^{\circ}$.

3. Which of the places had a pleasant climate with the minimum variation of Daily temperature?

(a) A (b) B
(c) C (d) D

Ans. (a) The daily temperature variation at A is only 5° C.

GRAPH 7

Q. 1. During which of the following periods was the whole-sale price Index relatively steady ?

(a) 72—74

(b) 75—77

(c) 77—79

(d) 78—80

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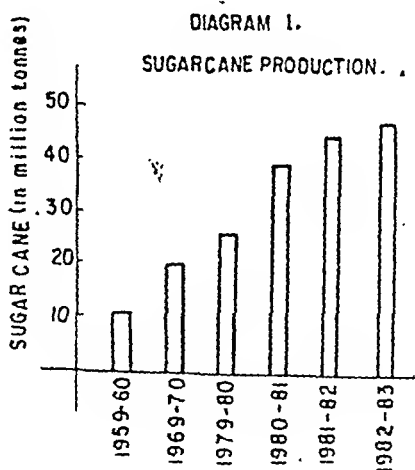
(a) 1971-72

(b) 1974-75

(c) 1975-76

(d) 1978-79

Ans. (c) Although there was a slight increase in the index during the first Quarter March to June of 1975-76 throughout the remaining period there was steady and significant decrease.



Q. 1. During which of the following periods was there a break-through in sugarcane production ?

(a) 1969-70

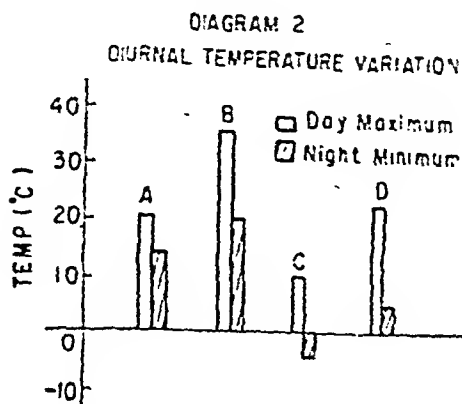
(b) 1980-81

(b) 1981-82

(d) 1982-83

Ans. (b) The first three bars in the Diagram cover the changes during two decades. So the increase of 100% associated with the second bar applies to the decade 1960-70. For 1980-81, the percentage increase

over the previous year is more than 50%. So we may call it a break-through.



Q. 1. The maximum and minimum temperatures on a particular day, for 4 places A, B, C and D are shown in the Diagram. In which place was the average of the daytime maximum temperature and the night minimum level?

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(c) C (d) D

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Q. 2. In which place do you find the extreme variation of the diurnal temperatures?

- (a) A (b) B
(c) C (d) D

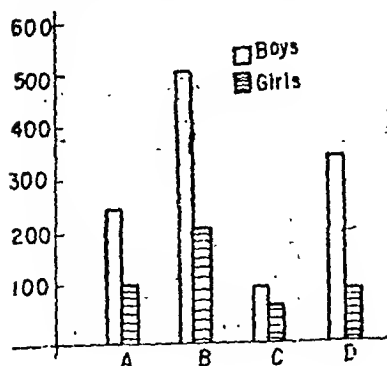
Ans. (d) At D, the temperature variation for the day was nearly $22^{\circ} - 5^{\circ} = 17$ degrees. Note that the temperature variation at C is only $10^{\circ} + 3^{\circ} = 13^{\circ}$.

Q. 3. Which of the places had a pleasant climate with the minimum variation of Daily temperature?

- (a) A (b) B
(c) C (d) D

Ans. (a) The daily temperature variation at A is only 5° C.

DIAGRAM 3
STUDENTS' COMPOSITION IN SCHOOLS



Q. 1. In which school was the percentage of girls in the student population maximum.

(a) A

(b) B

(c) C

(d) D

Ans. (c) Percentage of girls in school

$$C = \frac{60}{160} \times 100.$$

Q. 2. In which school was the number of girl students maximum?

(a) A

(b) B

(c) C

(d) D

Ans. (b)

Q. 3. Give a rough estimate of the total number of students in school A.

(a) 250

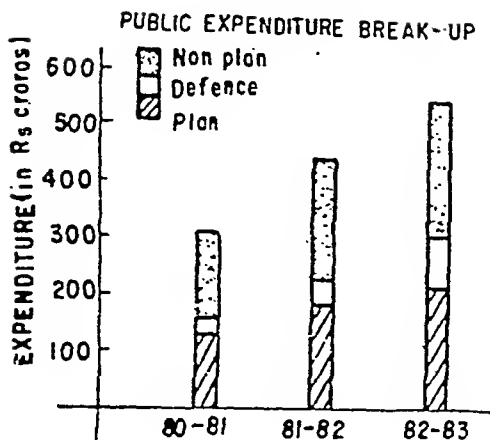
(b) 100

(c) 350

(d) 400

Ans. (c).

DIAGRAM 4.



1. A Government's expenditure is given under three heads—Plan, Defence, Non-Plan excluding defence. Which head (s) has received the same proportion of allocation for all three years under consideration?

(a) Plan and Non-Plan (b) All the three
(c) Non-Plan only (d) Plan only

Ans. (d) A rough visual estimate (or use of a scale) will show that the increase in Plan expenditure has been proportional to the increase in total expenditure.

2. In which two years have the allocations under all the three heads been in the same proportions?

(a) 80-81 and 81-82 (b) 81-82 and 82-83
(c) 80-81 and 83-84 (d) None

Ans. (a)

3. What percentage of the total expenditure has been allotted to Non-Plan head in 1982-83?

(a) 40 (b) 42
(c) 45 (d) 55

Ans. (c) A rough estimate is sufficient to fix the answer.

QUESTIONS

1. Continue the series ; 27, 25, 25, 22, 23, 19,.....
 (a) 17 (b) 16
 (c) 20 (d) 21 (1981)
2. Continue the series : 24, 35, 48, 63,.....
 (a) 75 (b) 80
 (c) 81 (d) 84 (1981)
3. According to a military code.
 SYSTEM is coded as SYSMET ;
 NEARER is coded as AENRER.
 What is the code for FRACTION ?
 (a) ARFCNOIT (b) CARFNOIT
 (c) RECAITNO (d) FRACNOIT (1981)
4. In a game of cards, moves are to be made according to the moves already made by the opponent and on the basis of the cards left with the opponent. Which traits are most important for success in this ?
 (a) Memory
 (b) Ability to predict opponent's move
 (c) Concentrated attention on one's own moves
 (d) Chance (1981)
5. Snakes and hawks are predators of mice in a field. Dogs which also feed on mice are brought on the scene. What will be the immediate result ?
 (a) Decrease in the number of snakes and hawks.
 (b) Decrease in the number of dogs.
 (c) Decrease the number of mice.
 (d) Increases in the number of snakes. (1981)
6. (i) All machines make noise.
 (ii) Some machines make noise.
 (iii) No machine makes noise.
 (iv) Some machines do not make noise.

Choose two of the above statements which are such that both of them cannot be true but both can be false.

- (a) statements (i) and (iii)
- (b) statements (ii) and (iv)
- (c) statements (ii) and (iii)
- (d) statements (iii) and (iv)

(1981)

7. None other than a gentleman is a member of the club
Some members are not officers.

All officers are called for the dinner.

Hence which of the following statements is true ?

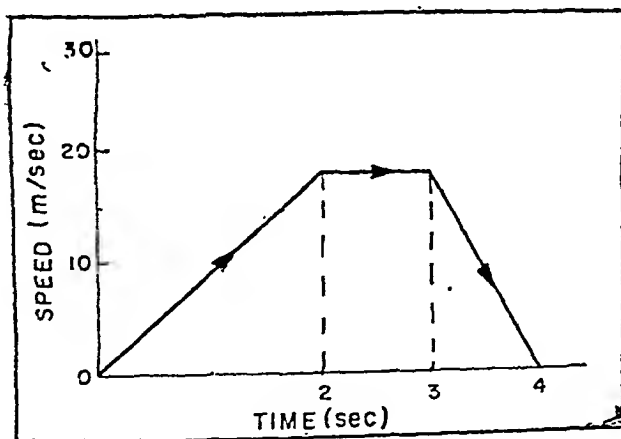
- (a) All gentlemen are the members of the club.
- (b) All the members are invited for the dinner.
- (c) All officers are the members of the club.
- (d) All the members are the gentlemen.

(1981)

8. The velocities of a body during 4 seconds of its travel are shown in the graph. Calculate the distance travelled in 4 seconds.

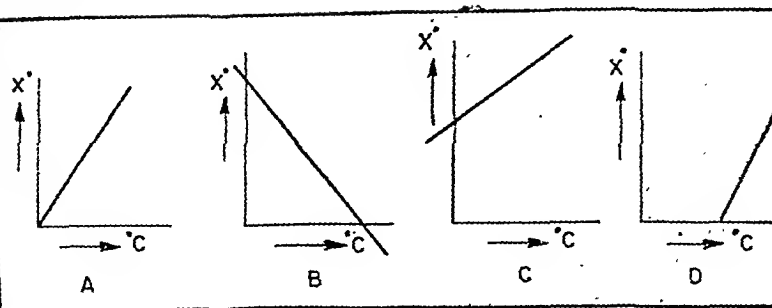
- (a) 40 m
- (b) 50 m
- (c) 80 m
- (d) 100 m

(1981)



9. Consider a new temperature scale 'Xelsius' where 0°C is 40°X and 100°C is 140°X . Which of the following graphs depicts the relation between the two scales ?

- (a) A
- (b) B
- (c) C
- (d) D

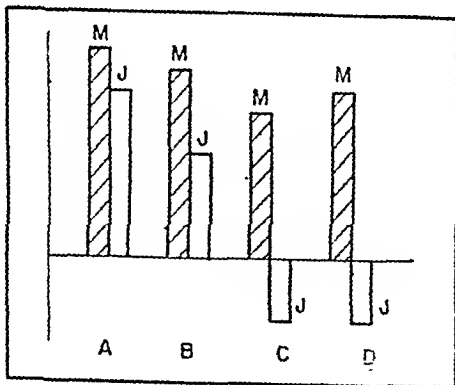


10. According to the above mentioned relation between the temperature scales, what will $98.6^\circ F$ be on the Xelsius Scale ?

- (a) 52 (b) 37
(c) 77 (d) 138.6 (1981)

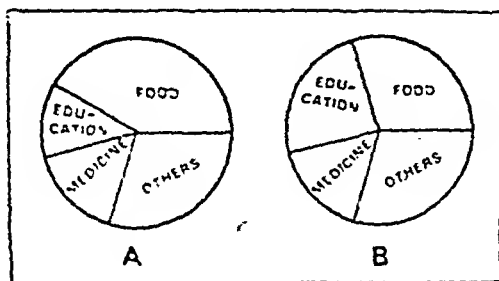
11. The average diurnal maximum temperatures of four towns A, B, C and D in the months of May and June are shown in the diagram. Which town had the maximum variation in temperature ?

- (a) A (b) B
(c) C (d) D (1981)



12. Figures show the expenditures of A and B. Which of the following conclusions cannot be reached from the figures ?

- (a) A spends more money on food than B.
(b) Both spend equal proportions of expenditure on medicine.

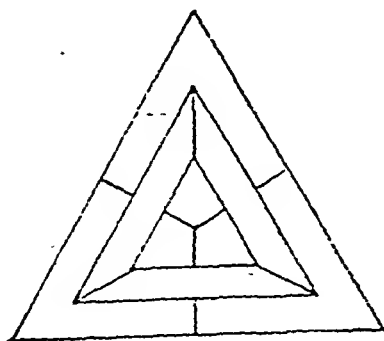


- (c) B spends a higher percentage on 'others' than on education.
- (d) The proportion of A's expenditure on education is less than the proportion on B's expenditure on education. (1981)
13. The minimum number of colours required to paint all the sides of a cube so that no two adjacent faces may have the same colour is

(a) 6 (b) 4
(c) 3 (d) 2 (1981)

14. A minimum of how many colours will be required to that no two adjoining portions in the given figure may have the same colour ?

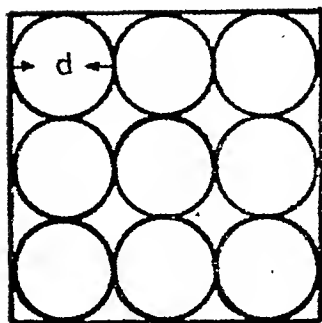
(a) 3 (b) 4
(c) 6 (d) 9 (1981)



15. In the given figure, if the diameter of each circle is d , what is the area of the square ?

(a) $9\pi d^2$ (b) $9/4 \pi d^2$
(c) $2d^2$ (d) $9d^2$

(1981)



16. If the area of one square is 'A', what is the area of the entire given figure ?

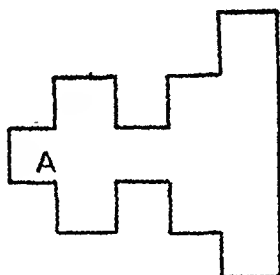
(a) $11A$

(b) $11A^2$

(c) $13A$

(d) $13A^2$

(1981)



17.

Test	I	II	III	IV
Average for the class	60	60	75	80
Range	30 to 90	45 to 75	20 to 100	30 to 90

A girl got 74 marks in all the four tests. In which test was her performance the best ?

(a) I

(b) II

(c) III

(d) IV

(1981)

18. The average age of 5 persons in 40 years ; the average of of other 10 persons in 25 years. What will be the average age of all the 15 persons ?

- (a) 27 years (b) 30 years
(c) 32 years (d) 35 years

(1981)

19. Two men do a work in 4 days. One of them can do that work in 12 days. How many days will the other man take to do that work ?

- (a) 6 days (b) 8 days
(c) 4 days (d) 12 days

(1981)

20. Now A's age is 6 times that of B. After 8 years, A's age will be twice that of B. What is B's present age ?

- (a) 2 years (b) 12 years
(c) 20 years (d) 60 years

21. Doctor is to patient as politician is to.....

- (a) Money (d) Public
(c) Cabinet post (d) Voter

22. Guilt is to Past as Hope is to.....

- (a) Despair (b) Life
(c) Future (d) Present

23. Man is to Biography as Nation is to.....

- (a) Geography (b) History
(c) Politics (d) Epigraphy

24. Continue the series : HI, JI, KL, ML, NO,.....

- (a) PQ (b) OP
(c) NP (d) PO

25. Fill in the blank ; DC, DE, FE,....., HG, HI.

- (a) GH (b) FG
(c) GF (d) EG

26. Fill in the blank; 240,....., 120, 40, 10, 2.

- (a) 240 (b) 120
(c) 180 (d) 200

27. Fill in the blank; 2, 4, 8, 32,....., 8192.

- (a) 64 (b) 128

28. Continue the series ; A, E, I, M, Q, U,.....

(a) W

(b) O

(c) Y

(d) S

29. Continue the series; 0, 5, 1, 2, 5, 5,.....,

(a) 7.5

(b) 8.5

(c) 9.5

(d) 6.5

30. Continue the series ; 1, 5, 8, 10, 11,.....

(a) 11

(b) 12

(c) 11.5

(d) 14

31. *Data on Worker's Union*

Particulars	1961-62	1974	1975
No. of unions on register	11416	25776	24547
No. of unions submitting returns	6954	5662	5624
Membership of unions submitting returns (000's)	3960	4197	4129

Which of the following statements are true ?

(i) The number of workers who have joined the unions has steadily increased.

(ii) There was an all-around decline in 1975.

(iii) The average membership [of the unions submitting returns was more over in 1974 than in 1961-62.

(iv) The percentage of unions submitting returns to the total number of registered unions has steadily decreased.

(a) Statements (i) & (ii). (b) Statements (ii) and (iii).

(c) Statements (i) & (iv) (d) Statements (iii) & (iv)

32. In a co-educational public school, boys and girls are divided into three groups on the basis of their performance—above average, average and below average. The following information is given on these different groups ; The number of 'average boys' is higher than the number of 'below average' boys but not higher than the number of 'above average girls'. The number of 'above average'

boys is higher than the number of 'average' boys and the number of 'below average' boys, 'Below average' boys are more numerous than 'average' girls. 'Average' boys are less numerous than 'below average' girls. Which among the girls' groups is the least numerous ?

- (a) 'Above average' Girls (b) 'Average' Girls
(c) 'Below average' Girls (d) Not known

33. Continue the series : N, Q, K, T, H,.....

- (a) G (b) X
(c) V (d) W

34. Two numbers below have got the same digit numbers. Find them out and get the arithmetic sum of their digit numbers.

572314, 562349, 132754, 275467, 427195

- (a) 22 (b) 29
(c) 17 (d) 20

35. Sport out the stranger :

- (a) Pencil (b) Pen
(c) Club (d) Brush

36. If Ram had Rs. 3/- less than what he is having now, he would have had half as much as Ramesh. Ram has Rs. 10/-. How much does Ramesh have more than Ram?

- (a) Rs. 7/- (b) Rs. 4/-
(c) Rs. 2/- (d) Rs. 14/-

37. If BAD is coded as DBH, FACE is coded as DBH, what will be the last letter of the code-word for FIVE?

- (a) N (b) O
(c) K (d) M

38. Which of the following letters does not belong to the series ?

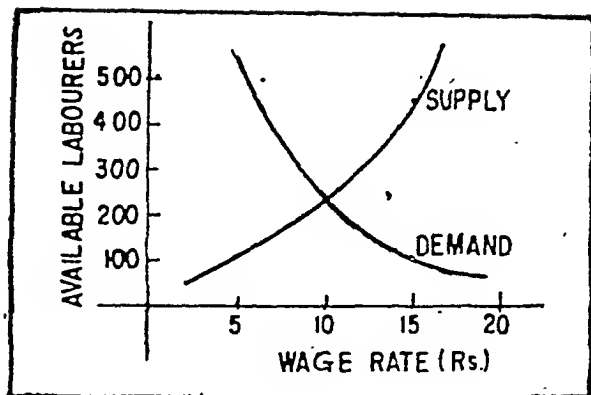
Z X V Q U F

- (a) V (b) Q
(c) F (d) U

39. If $20-2=20$, $25-4=50$, $30-3=15$, $35-2=70$, $40-1=40$

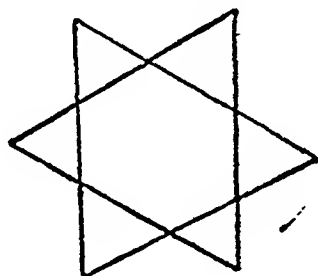
- (a) 36 (b) 45
(c) 874 (d) 55

40. If John's father is Jack's son what relation is John to Jack?
(a) Son (b) Grandson
(c) Nephew (d) None of these
41. A watch reads 4:30: If the minute-hand points to East, in what direction does the hour-hand point ?
(a) North East (b) South East
(c) North West (d) North
42. If you do not think that four cows are less valuable than seven rats, then write X, unless two dogs can make more noise than three cats, in which case you write Y; otherwise write Z.
(a) X (b) Y
(c) Z (d) Not known
43. If A is mortal, B is wise. If C is not good, D, will suffer. If D suffers, B is not wise. If E is a slave, A is immortal. It is known that D suffers. What follows ?
(a) A is mortal (b) A is immortal
(c) C is good (d) C is not good
44. Students are generally good.
A person who is beaten frequently does not remain good. Which of the following conclusions follows definitely ?
(a) No student is beaten frequently.
(b) Some students are never beaten.
(c) Many students are beaten frequently.
(d) Many students are not beaten frequently.
45. Some lazy can be reformed.
Some politicians are not lazy.
Which of the following conclusions cannot be true at all?
(i) All politicians can be reformed.
(ii) No politicians can be reformed.
(iii) Some politicians can be reformed.
(a) Statements (i) (b) Statements (ii) and (iii)
(c) All statements (d) None of the statements.
46. At the wage rate of Rs. 15/- there will be :
(a) 250 surplus labourers.
(b) 250 deficit in labourers.
(c) 400 surplus labourers.
(d) 403 deficit in labourers.



Into a maximum of how many mutually exclusive triangular areas can the entire area of the given figure be divided by drawing three straight lines?

- (a) 6 (b) 9
(c) 12 (d) 24



Expansion of Investment in Public Sector in India

Period	Number of enterprises	Investment (Rs. crores)	Average annual growth rate (%)
At the commencement of			
First Plan	5	29	—
Second Plan	21	81	36
Third Plan	48	953	233
As on 31 March			
1966 (end of III Plane)	74	2415	31
1970	91	4301	10
1972	101	5052	8
1973	113	5571	10
1974 (end of IV Plan)	122	6237	12

- (1) In general, the average annual growth rate in the number of enterprises for the period 1966 to 1974
- less than the average annual growth rate in investment
 - more than the average annual growth rate in investment
 - nearly 20%
 - none of the above.

49. Which of the following statements is warranted by the above given data ?

- The average annual growth rate in investment was most impressive during the second plan
 - The average annual growth rate in investment was most impressive during the third plan
 - The total investment made in 1973 on public sector is Rs. 5571 crores.
 - The total investment made in 1973 on public sector is Rs. 521 crores.
- Statement (i)
 - Statement (ii)
 - Statement (iii)
 - Statement (iv)

50. You know that three shop-keepers A, B and C sell one and the same good whose cost price per piece is Rs. 80. Shop-keeper A offers it at a fixed price of Rs. 88. Shop-keeper B has marked the price at Rs. 100 but gives a discount of 12%. Shop-keeper C conducts a bargain sale and announces the price as Rs. 120. After a lot of bargain he offers it at a price which gives him 10% profit. From which shop-keeper would you prefer to buy in future ?

- A
- B
- C
- Any of them

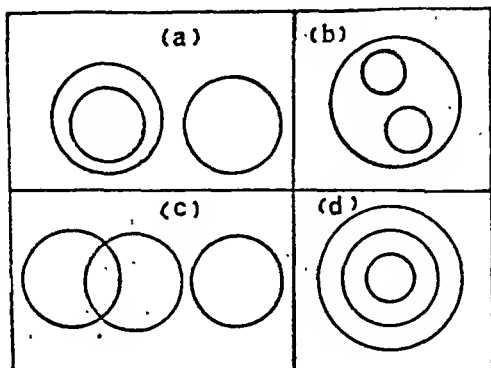
51. The I.Q. can be best expressed by the formula

- $\frac{\text{Actual age}}{\text{Mental age}} \times 100$
- $\frac{\text{Mental age}}{\text{Actual age}} \times 100$

(c) $\frac{\text{Mental age} \times \text{Actual age}}{100}$

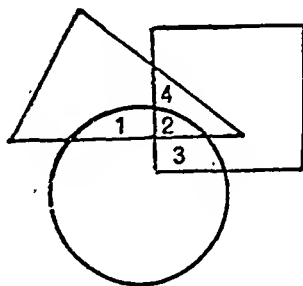
(d) $(\text{Mental age} + \text{Actual age}) + 100$ (1982)

52. Which of the following diagrams indicates best the relations between Judges, Thieves and Criminals? (1982)



53. In the given diagram, circle represents strong men; square represents tall men; triangle represents Army Officers. Which region represents Army Officers who are tall but not strong? (1982)

- (a) 1 (b) 2
(c) 3 (d) 4



54. Money doubles itself in five years. A man invests Rs. 5,000/- in each of the years 1900, 1905 and 1910. The amount he gets in 1980 is
- (a) Rs. 65,000/- (b) Rs. 75,000/-
(c) Rs. 1,40,000/- (d) Rs. 1,25,000/-
55. The average height of the students in a class of 10 is 105 cm. 20 students with average height of 110 cm are added to the class. The new average height of the class is

120 cm are admitted into the class. What would be the new average height ? (1982)

- (a) 115 cm (b) 112 cm
(c) 110 cm (d) 105 cm

56. A man spends a fixed amount per month for his petrol consumption. The amount of petrol purchased by him at different prices are given below. What will be his consumption of petrol at Rs. 6/- a litre? (1982)

Price (Rs.):	1.50	2.00	3.00	4.50	6.00
Litres :	60	45	30	20	?

- (a) 10 (b) 12.5
(c) 15 (d) 16

57. A man has to walk 6 kms to cover all the boundaries of a rectangular farm of area 2 sq. km. What is the difference between the two sides of the farm? (1982)

- (a) 0 km (b) 1 km
(c) 2 km (d) 0.5 km

58. Continue the series 4, 196, 16, 144, 36, 100, 64,.....

- (a) 48 (b) 64
(c) 125 (d) 256

59. The code for certain letters are indicated in the following words. What is the code for D?

BRAIN 12345

GRADE 72308

DRAIN 02345

STATE 78388

(a) 0

(b) 1

(c) 2

(d) 9

60. Point out the odd one.

(a) S O K I

(b) R N J F

(c) T P L H

(d) N J F B

(1982)

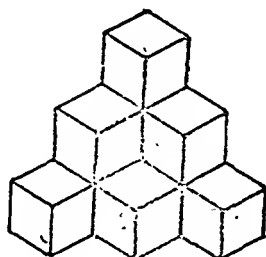
61. A question must be set on one of the eight poets ABCDEFGH every year. Of these, the first 4 are considered to be medieval and the last 4 modern. The general trend is that if the question is set on the first group in one year, then the following year the question is set from the other group. Generally, if one is fond of H, then one is also fond of G, and a person who likes F also likes E. The paper-setter of a particular year is very fond of F

but does not like to set a question on him as he has written a book on him (F). The question set the year before that was on the poet A. The poet on whom the question is most likely to be set this particular year is

- (a) F (b) E
(c) G (d) H (1982)

62. How many cubes are there in the diagram?

- (a) 8 (b) 9
(c) 10 (d) 13 (1982)

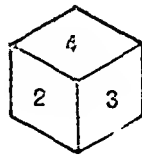
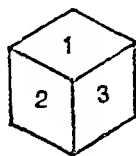
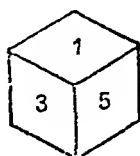


63. A cube is painted on all sides. If it is cut into several more cubes so as to have the side of the new cubes exactly $\frac{1}{4}$ th of the original cube, how many of these cubes will have one side only painted? (1982)

- (a) 16 (b) 24
(c) 12 (d) 32

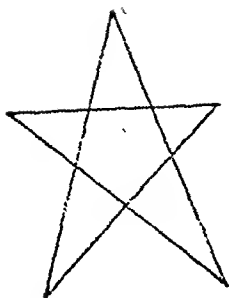
64. A cube having numbers 1 to 6 on its 6 sides is shown at various angles in the diagram. Which is the number opposite to 3? (1982)

- (a) 1 (b) 2
(c) 5 (d) 6



65. How many different triangles can be identified in the given diagram? (1982)

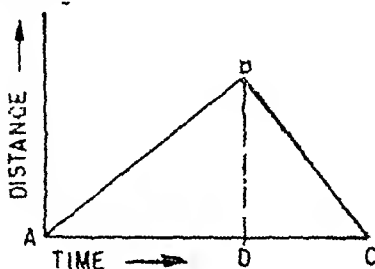
- (a) 5 (b) 8
(c) 10 (d) 14



66. Which of the following statements can be concluded from the graph given?

- (a) The man covers the distance BD in time AC.
- (b) The man walks a certain distance with a certain speed and comes back to the starting point at higher speed.
- (c) The man walks a certain distance at a given speed and returns to the starting point at a lower speed.
- (d) The distance travelled by the man is indicated by area of the diagram ABC.

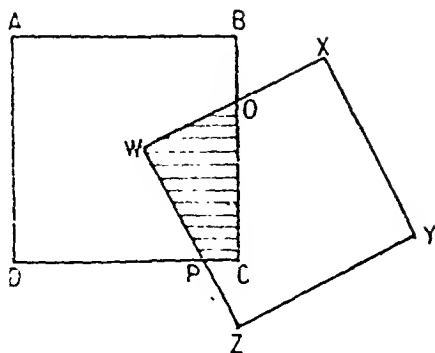
(1982)



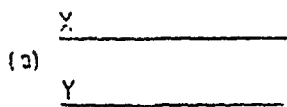
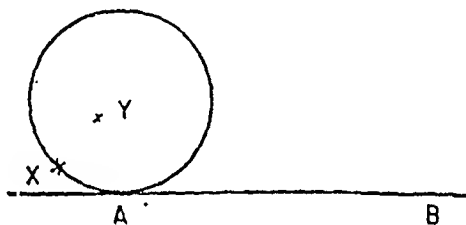
67. ABCD and WXYZ are two square card-boards of size $2a$. Square ABCD is fixed and square WXYZ is fixed at W to the centre of the other square and can rotate about W in the same plane. Now what is the relation between distance BO and area WOCP?

- (a) As BO increases, area decreases.
- (b) As BO increases, area increases.
- (c) As BO changes, area remains constant.
- (d) No definite relation can be established between the two.

(1982)



68. X and Y are fixed points on a wheel as indicated in the diagram. When the wheel rolls on the line AB, the paths described X and Y are represented by (1982)



69. The population of a town at different time intervals are shown below. Point out during which period the population increase maximum?

Year : 1940 1950 1960 1970 1980

Population : 40,000 50,000 60,000 70,000 80,000

(a) 1940-50

(b) 1950-60

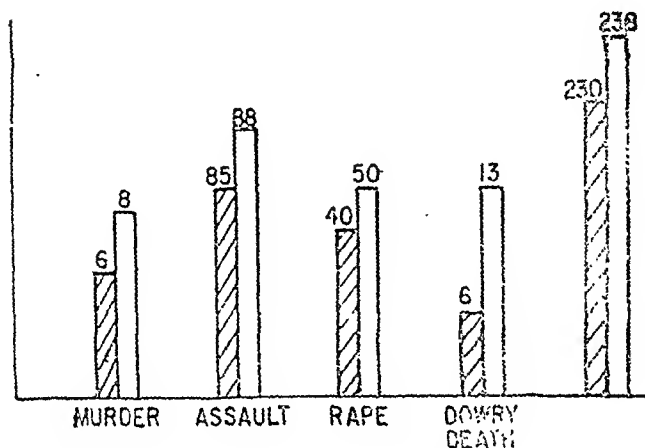
(c) 1960-70

(d) 1970-80

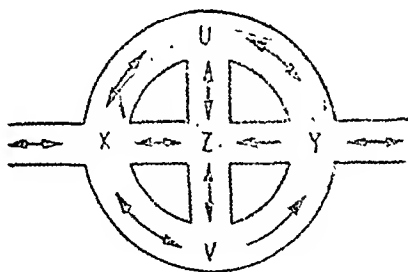
70. Given below is the diagram chart of women employed for 1980 and for the first 3 months of 1981.

Indicate which crime has shown the maximum percentage increase?

- (a) murder (b) rape
(c) assault (d) dowry death (1982)



Problem Figure for Questions 71 and 72



71. What is the maximum number of bus routes possible from X to Y so that the bus does not come to one junction more than once in a route? (1982)
- (a) 4 (b) 6
(c) 8 (d) 9
72. Which is the most crowded junction, assuming that each arrow denotes equal traffic? (1982)
- (a) U (b) X
(c) Y (d) Z

appears that men exist on other planets. Based on the above statements what can we conclude about the UFOs ?

- (a) UFOs are not real.
- (b) UFOs definitely exist.
- (c) UFOs are manned by men from outer space.
- (d) There is a possibility of existence of the UFOs.

(1983)

80. A man has a wife, two daughters and two sons. His daughters have gone out to a party. All the menfolk have gone out for a picnic. The father of the man has not yet returned from office. Which of the following statements is true ?

- (a) only women are left at home.
- (b) at least the man's wife is at home.
- (c) nobody is at home.
- (d) nothing definite can be said about the persons remaining at home.

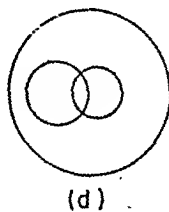
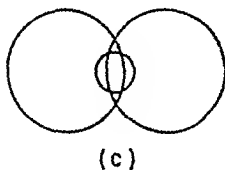
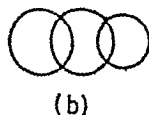
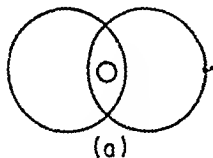
(1983)

81. All artists are whimsical. All drug addicts are whimsical. Some crazy people are drug addicts. So

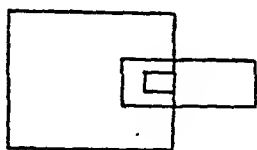
- (a) some artists are drug addicts.
- (b) some artists are not drug addicts.
- (c) some crazy people are whimsical.
- (d) some crazy people are artists.

(1983)

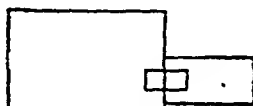
82. There are some animals which live on land and some which live in water. Which diagram given below best illustrates the position of the frog ?



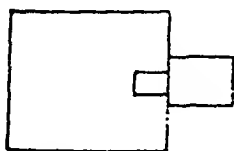
83. Which of the following diagrams represents best the relationship between Asia, Europe and U.S.S.R. ? (1983)



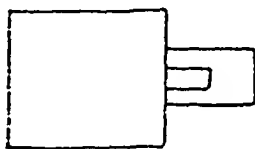
(a)



(b)



(c)



(d)

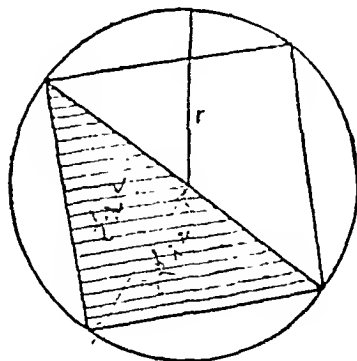
84. Given below is a circle of radius is 'r'. Find out the area of the shaded portion, (The area of a circle is πr^2 .) (1983)

(a) r^2

(b) $\frac{\pi}{4} r^2$

(c) $\frac{4}{3} \pi r^2$

(d) $4r$



85. The diameter of the smaller circle in the middle in the diagram below is

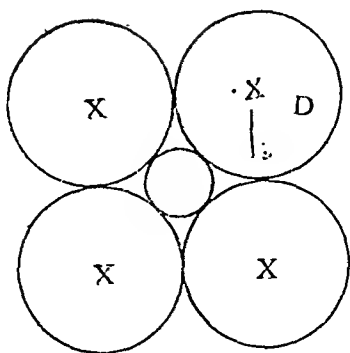
(a) $\frac{D}{2}$

(b) $\frac{D}{4}$

(c) $\frac{2}{5} D$

(d) $\frac{D}{\pi}$

(1984)



86. The graph given below is represented by the equation

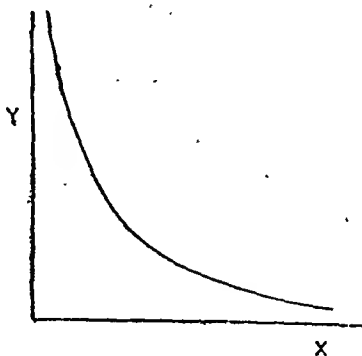
(a) $Y = \frac{1}{X}$

(b) $Y = -X$

(c) $Y = X^2$

(d) $X^2 = Y$

(83)



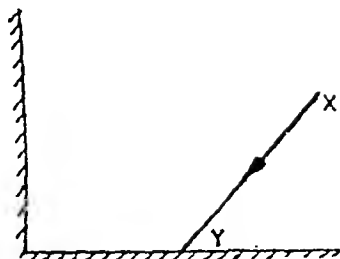
87. Two mirrors are placed perpendicular to each other as shown in the diagram below. A ray of light XY will be reflected in the second mirror in a direction.

(a) perpendicular to XY (b) parallel to XY

(c) perpendicular to the second mirror

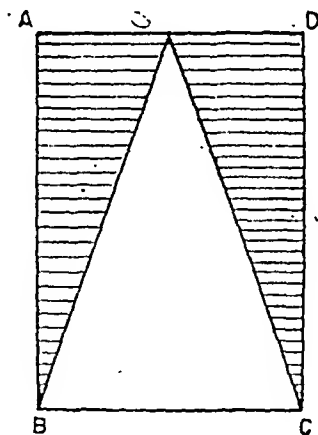
(d) perpendicular to the first mirror

(1983)



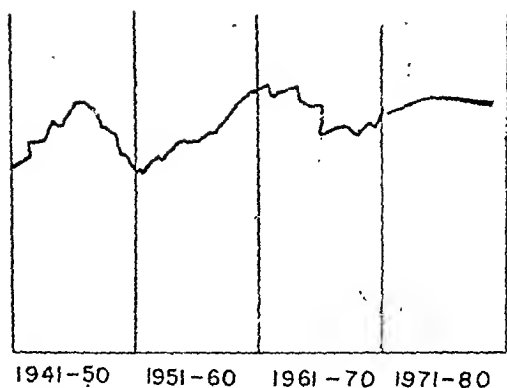
88. In the following diagram $AB=2AD=d$. Then the area of the shaded portion will be

- (a) d^2 (b) $\frac{d^2}{2}$
 (c) $\frac{d^2}{4}$ (d) $2d^2$ (1983)



89. Given below is the graph showing the movement of the price of silver for the period 1941-1980. During which of the following periods was the price of silver most stable?

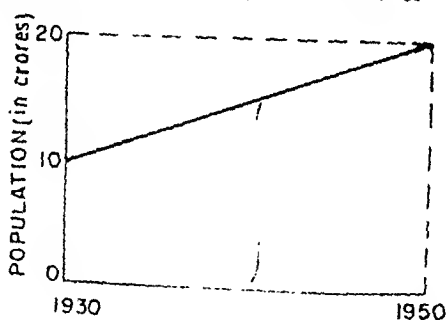
- (a) 1941-50 (b) 1951-60
 (c) 1961-70 (d) 1971-80 (1983)



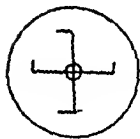
90. The graph given below represents the population growth for the period 1930-1980. What was the population in 1940 according to the graph?

(a) 11 crores (b) 11.5 crores
(c) 12 crores (d) 12.5 crores

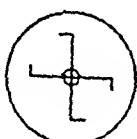
(1983)



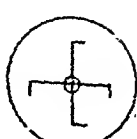
91. Which of the following responses will continue the series given below?



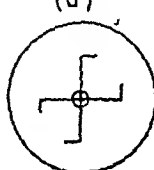
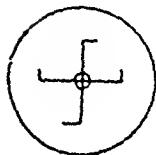
(a)



(b)



(c)



(d)

92. Which of the following responses will continue the series given below ? (1983)



(a)



(b)



(c)



(d)



ANSWERS

1. d	2. b	3. b	4. b	5. c
6. a	7. d	8. b	9. c	10. c
11. d	12. a	13. c	14. a	15. d
16. c	17. b	18. b	19. a	20. a
21. d	22. c	23. b	24. d	25. b
26. a	27. c	28. c	29. b	30. a
31. b	32. b	33. d	34. a	35. c
36. b	37. a	38. a	39. a	40. b
41. a	42. b	43. b	44. d	45. d
46. a	47. c	48. a	49. a	50. a
51. b	52. a	53. d	54. c	55. a
56. c	57. b	58. b	59. a	60. a
61. b	62. c	63. b	64. d	65. c
66. b	67. c	68. d	69. a	70. d
71. b	72. b	73. b	74. a	75. d
76. a	77. c	78. b	79. d	80. d
81. c	82. a	83. b	84. a	85. c
86. a	87. b	88. c	89. d	90. c
91. d	92. d			.

